SKYWAYS

al Section

Planes of the USAF... Photos, Speed & Specs

RYAN NAVION

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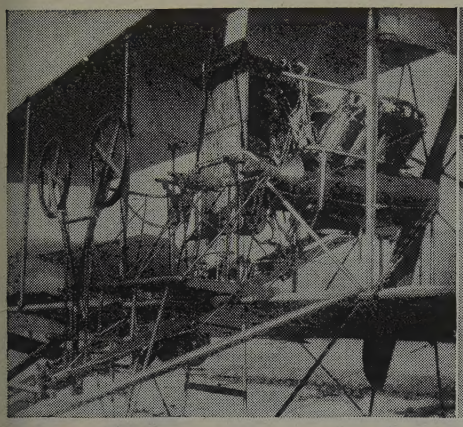
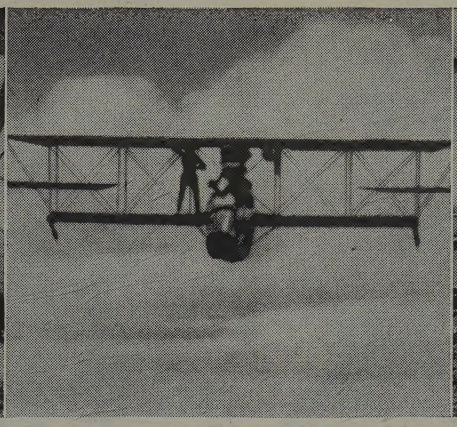
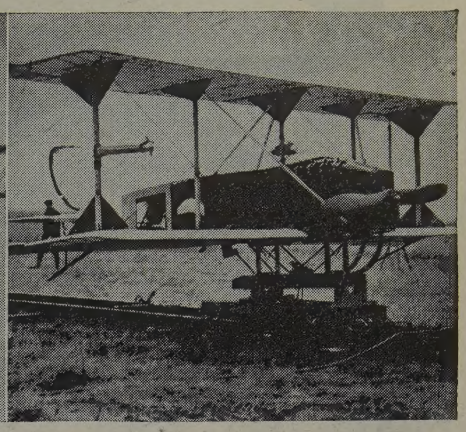
40 YEARS OF AUTOMATIC FLIGHT...BY SPERRY



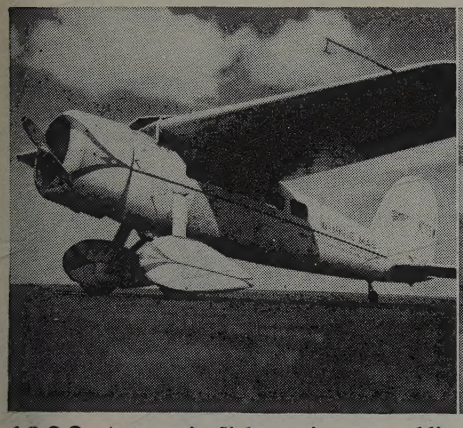
1912 The first Sperry automatic pilot was flight tested in a Curtiss hydroaeroplane in 1912 at Hammondsport, New York. This was the world's first gyroscopic automatic pilot to fly an aeroplane.



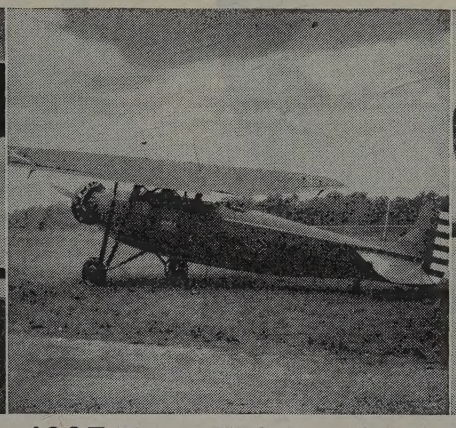
1914 Lawrence Sperry, in a public demonstration of automatic flight in Paris, 1914, won the International Safety Competition with his "stable" aeroplane.



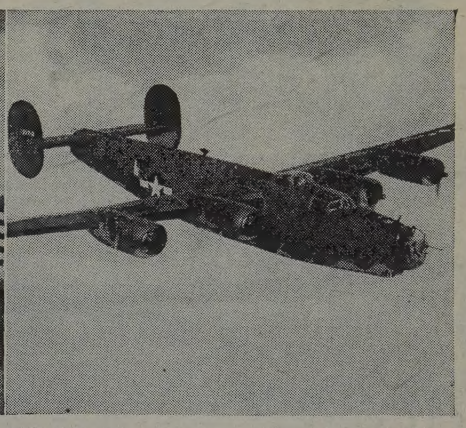
1916 Ancestor of the guided missile was the aerial torpedo developed during 1916-18 by Sperry working with the U.S. Navy. These automatically controlled "flying bombs" were tested over Great South Bay, Long Island.



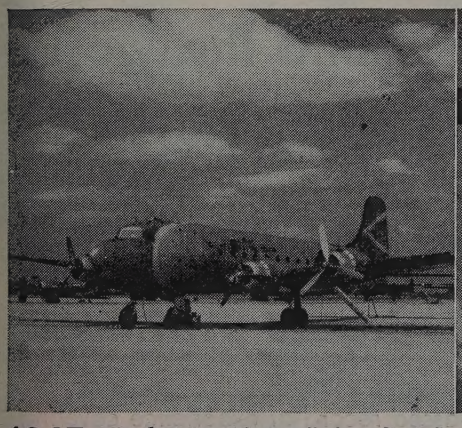
1933 Automatic flight again won public acclaim in 1933 when Wiley Post made the first solo flight around the world with the Sperry automatic pilot as his "co-pilot" in the WINNIE MAE.



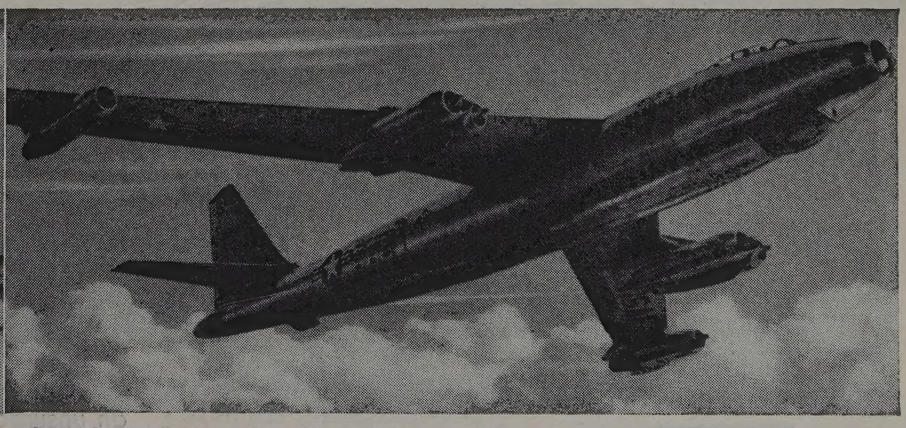
1937 First completely automatic landings were made by the U.S. Army Air Corps in 1937 by coupling radio aids to the Sperry automatic pilot.



1943 The first electronic automatic pilots flew thousands of B-24 s in World War II and advanced the art of precision bombing by providing an improved stable platform.



1947 The first "pushbutton" aircraft, U.S. Air Force's All-Weather Flying Division's C-54, equipped with Sperry automatic pilot and automatic approach control, crossed the Atlantic both ways in 1947 without human hands touching the controls—including take-offs and landings.



1952 The modern Gyropilot* flight control is the outgrowth of Sperry's 40 years of research, development and manufacture of automatic controls for aircraft. This versatile, all-weather pilot represents a high-performance technique for automatic control which is readily adaptable to all types of aircraft—airliners, executive craft, jets, helicopters, lighter-than-air ships and guided missiles. This technique pioneered by Sperry has led to a new fundamental concept of flight for the aircraft of tomorrow. Sperry Gyroscope Company Division of The Sperry Corporation, Great Neck, New York.

*T.M. REG. U.S. PAT. OFF.

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an unsurpassed record of experience covering every condition of training, alert and combat

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SKYWAYS

Cover: Lockheed F-80's — *June, 1952*

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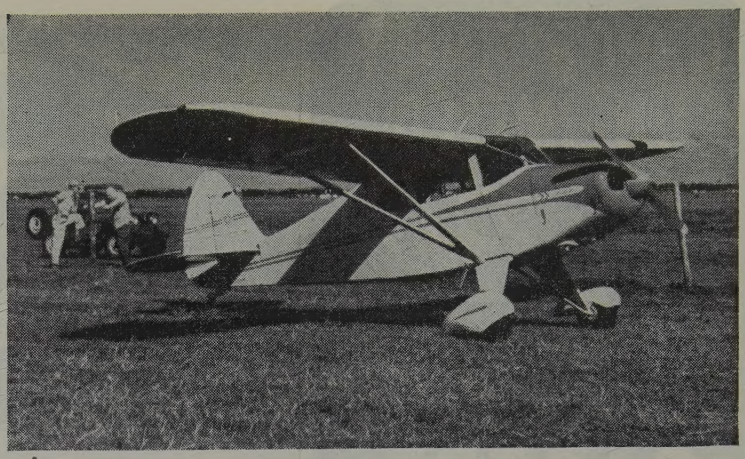
AMERICA'S FAVORITES



PACER For high performance at economical power, discriminating pilots pick the fast, far-ranging Pacer. Cruises up to 134 mph (Model 135 at 5000 feet). Excellent short field performance, terrific climb for economical upper-air cruising. Costs less to operate than the average car; sells for thousands of dollars less than any other four-place plane.

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In many fields of business, industry, and agriculture, people who have never flown before have learned to use their Pipers quickly and easily... and, above all, safely.

New ease of flight—*such as simplified controls and tricycle landing gear of the Piper Tri-Pacer* — plus greatly simplified navigation — *by the new nationwide network of omni-range stations* — have done much to make it practical for you or your business to use a Piper profitably.

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SUPER CUB Uranium hunting, exploring, fence checking, rounding-up cattle, dusting, spraying, pipe line patrol, construction supervision, timber cruising—just a few of hundreds of jobs for this versatile plane that uses less than 50 yards for take-off or landing. Five versions: 2-place utility plane; "quarter-ton" truck; sprayer (110 gallon capacity); duster (18 cu. ft. capacity); and seaplane.

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In the Automatic Tri-Pacer, with Lear Automatic Pilot automatic altitude control, and automatic direction finder, you just dial your destination, sit back and relax—fly for hours without ever touching the wheel! It's the simplest form of personal transportation ever devised for man. Write for special brochure on Automatic Tri-Pacer.

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AIRCRAFT CORPORATION
Lock Haven, Pennsylvania

AIR YOUR VIEWS

Aero-Flight Streak

Gentlemen:

In your April 1948 issue, you showed a picture of the Aero-Flight *Streak*. Did this airplane ever go into production, and can you give me the address of the Aero-Flight Co.?

E. LIMMIATIS

Miami, Florida

Nothing has been heard of the Aero-Flight Corp., lately and it is not listed in current aircraft company directories. The last address we had was P.O. Box 2010, Long Beach Municipal Airport, Long Beach, California. I don't believe the Streak *ever did go into full production.*—ED.

Swimming Pool Plane

Gentlemen:

For months a friend of mine has claimed that the Howard Hughes *Hercules* flying boat was *not* designed, at first, to have a swimming pool inside its hull. I am sure I saw a plan of this plane years ago and it had a small pool inside. If you have any information on this detail. I'd appreciate getting it.

D. W. MANGRUM

New York, N. Y.

The swimming pool idea is a new one on us. However, being aware of Hughes' "production" ability, the idea might very well have been entertained. Suggest you write to Hughes Aircraft Co., Florence Avenue at Teale St., Culver City, California, for verification of that swimming pool idea. It's our guess that it's wrong.—ED.

White Smoke?

Gentlemen:

A friend and I have been having an argument about white smoke or some other substance coming from airplanes at high altitude. We can't tell whether they are jets or propeller-driven planes. My friend says they are jets. I say they are rocket-assisted planes with a heavy load. Which of us is right?

J. W. WYCHE

Thomasville, Ga.

The "white smoke" you are referring to is, in all probabilities, the vapor trail that a high-speed plane creates at high altitude. Vapor trails off the wing tips of a jet plane are quite a common sight.—ED.

Stalls an' Banks

Gentlemen:

I just finished reading Dr. Greene's article on airplane stalls and banks (April issue) and I found it a very informative piece. It explains some mysterious happenings I was a witness to. First, however, let me explain that I am not a pilot, although I am intensely interested in aviation and its theories from a completely amateur standpoint. I have read a good deal about stalls and other flight characteristics in your fine magazine and in others, but Dr. L. M. Greene does much to clear up certain doubts as to what causes stalls. But isn't this the old "angle of attack" explanation in a different light? Dr. Greene says the more back elevator used the more of chance of a stall in a flat or less steep bank. Using more elevator merely raises the angle of attack to its critical stage. If this is true, and it is the angle of attack once again, perhaps he has confused some readers. Is it also true that high-speed fighter planes can stall out at tremendous speeds by pulling out of a dive too acutely, thus stalling the wing? This dive and pull-out is just another bank only in a different geometric plane, at least to my thinking. Now ... as to how this might explain a crash or two I remember ... during the war, a B-24 crashed on approach about a half mile from the edge of the runway. I couldn't justify it at all. I knew the plane had plenty of forward speed, but the pilot was making one of those banking approaches and, his being somewhat of a hot-rock, I can see where he could easily have made a mistake and stalled out in the turn. This happened on more than one occasion that I can verify myself.

NELSON LAWRENCE

Rahway, N. J.

Thank you for your letter, Mr. Lawrence. We passed it on to Dr. Greene, and here are his interesting comments: "In Mr. Lawrence's letter he asks if my article is just another way of presenting "angle of attack" explanation in a different light. This is true and it is gratifying that Mr. Lawrence feels the article does much to clear up certain doubts. However, angle of attack is not the complete story. There are factors which angle of attack does not cover, namely, power, flaps, ground effect and Reynolds No. If Mr. Lawrence wants to be more exact, he should express the pre-stall margin in terms of lift coefficient margin. The lift coefficient is exactly proportional to the loading of the wing." Mr. Lawrence, we hope this reply by Dr. Greene further helps in your analyzation.—ED.

Mach Number

Gentlemen:

In your April issue in the special section about "Jet Fighters in Western Europe," you mention "Mach." Will you please tell me what this represents and how to pronounce it?

BILL WHEATON

Montreal, Quebec, Canada

Why surely. In the first place "Mach" is pronounced "mock." The Mach number is the ratio of the velocity of an object to the speed of sound under the same atmospheric conditions. A speed of Mach 1 means the speed of sound regardless of altitude. A speed of Mach .5 means that the speed is one-half the speed of sound for that particular altitude. The speed of sound at sea level is 761 mph. At 35,000 feet, it is about 660 mph. If an airplane is said to have a speed of Mach .9 at 35,000 feet, that means it has a speed of .9 x 660 mph or . . . 594 mph. If a plane is said to have a speed of Mach 1.5 at 35,000 feet, it would be 990 mph . . . and not an unreasonable speed these days, either.—ED.

Thrust Rating

Gentlemen:

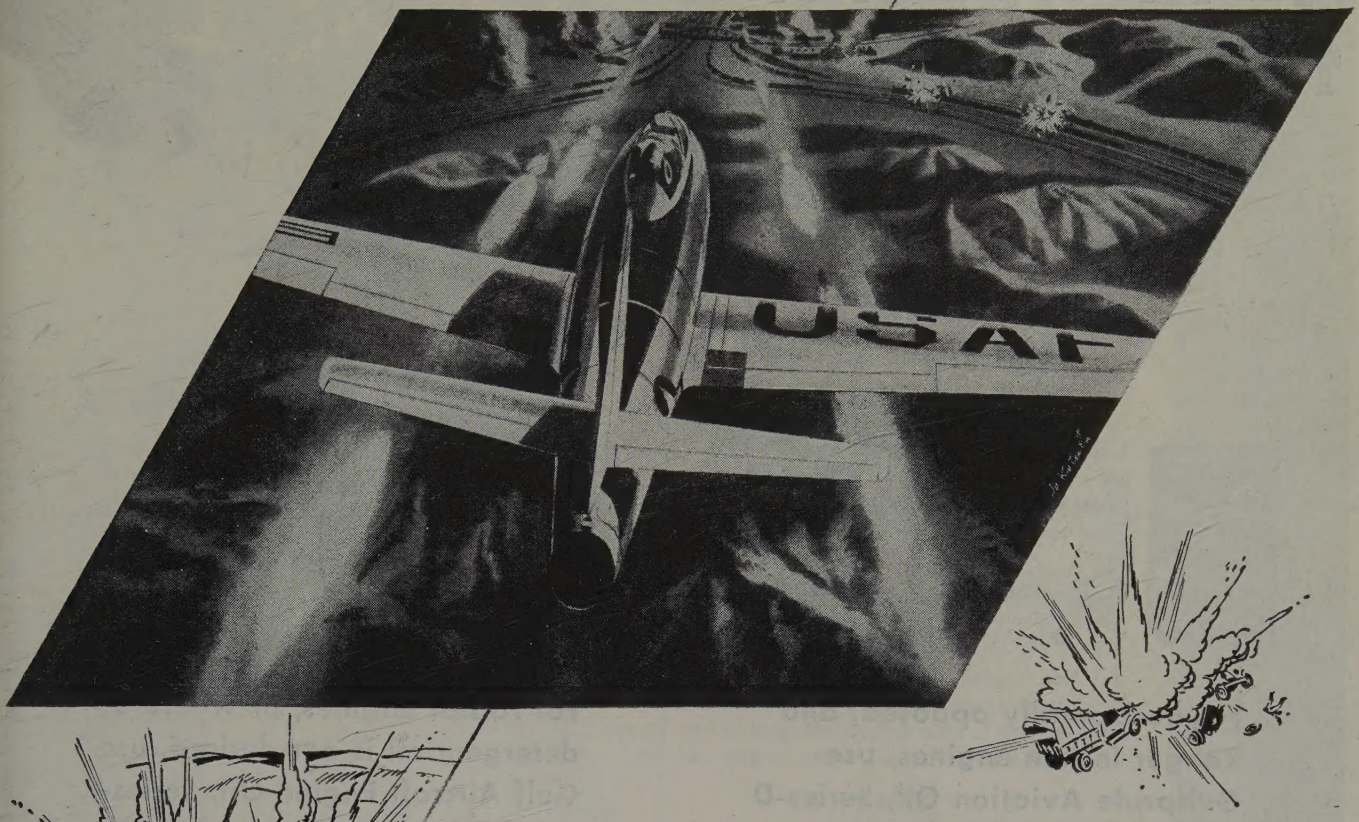
Re: "Jet Fighters of Western Europe," your writer does not know anything about British jet engines because he rated the Rollys-Royce *Avon* as producing a thrust of 7,000 to 7500 pounds. Estimate or not, it does not produce that high a thrust rating. I have a release booklet on this engine from the company that builds it and the booklet rates it at 6500 pounds thrust.

MARCEL TETREAULT

Radville, Sask., Canada

The author of that article (William Green) is an acknowledged authority on British Aviation. He is one of Great Britain's leading aviation writers and has been for several years. From experience, we've learned that his estimates are never too far out of the way. It's our guess that the 6500 pounds thrust as quoted in the company booklet is just the "released" figure. As you well know, it is common practice to release figures (speed, horsepower, pounds thrust, etc.) somewhat—and sometimes considerably—below the actual ones. All this for "security" purposes.—ED.

INTERDICTION....



It's a fine word . . . it describes a great military concept . . . it is the use of air-power to strangle aggressor forces by destroying their supply lines. Interdiction isolates the fighting enemy from his support. ➢ ➢ ➢ Greatest effective weapon to wage successfully this phase of warfare . . . as a combat tested, fighter-bomber in Korea, the Thunderjet has proven its ability to carry out the multiple requirements of interdiction.

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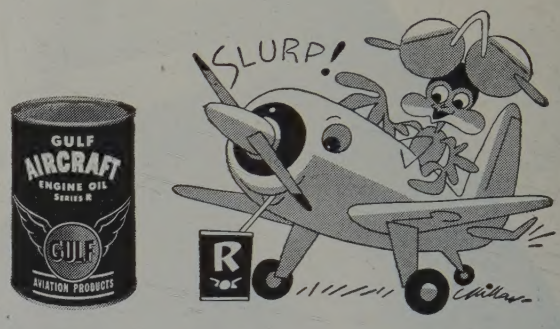
Which type of oil is best for your airplane engine?

For smooth, reliable performance—and to s-t-r-e-t-c-h the time between overhauls—just remember these two recommendations from Gulf:

For horizontally opposed, and Ranger in-line engines, use Gulfpride Aviation Oil, Series-D

Here's the world's finest detergent-dispersant aviation oil. By keeping contaminants "in suspension" and thus preventing them from forming harmful deposits, Gulfpride Aviation Oil, Series-D, minimizes ring and valve-sticking, oil consumption, oil screen-clogging, and plug-fouling.

Gulf's exclusive Alchlor process—an *extra* refining step—makes this oil *extra*-pure, *extra*-efficient. Users of Gulfpride Aviation Oil, Series-D, have actually increased periods between engine overhauls as much as 100%!



For radial engines, or where a detergent oil is not desired, use Gulf Aircraft Engine Oil, Series-R

Here's the best-quality buy in a non-detergent, straight mineral lubricating oil. Gulf Aircraft Engine Oil, Series-R, is approved by Pratt & Whitney and meets the requirements of other aircraft engine manufacturers for all types of service in radial engines. It may also be used in horizontally opposed engines when operating conditions do not require a detergent oil.

Gulf Aircraft Engine Oil, Series-R, retards sludge and carbon formation, and retains its body at high operating temperatures.

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It's great to go flying with GULF

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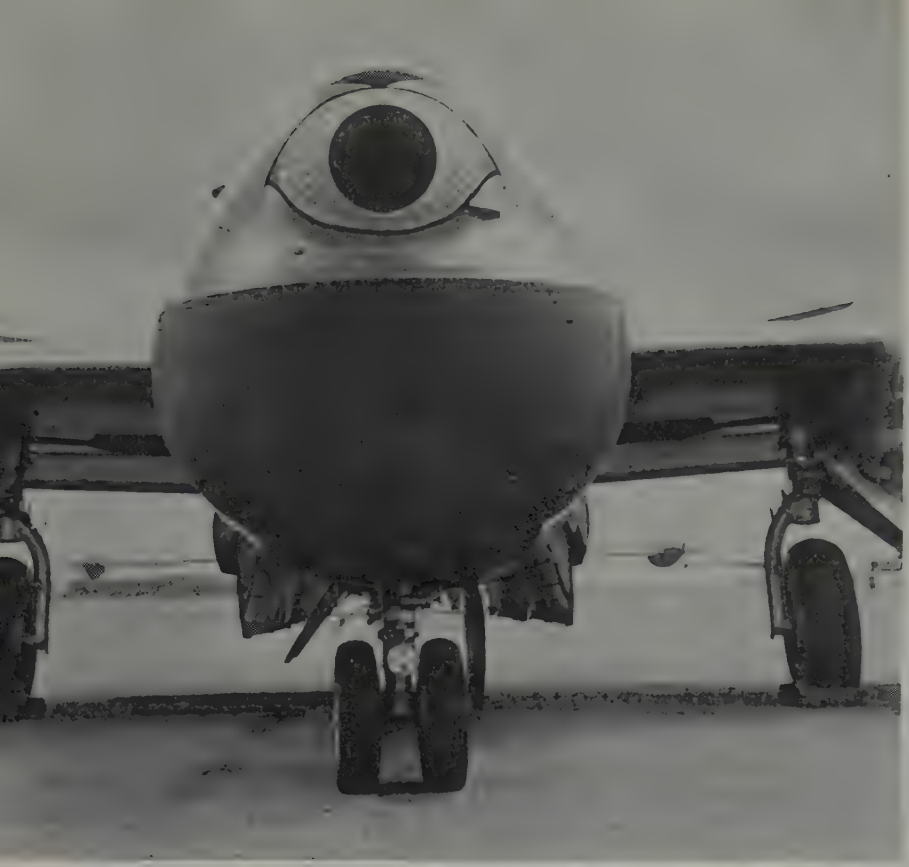


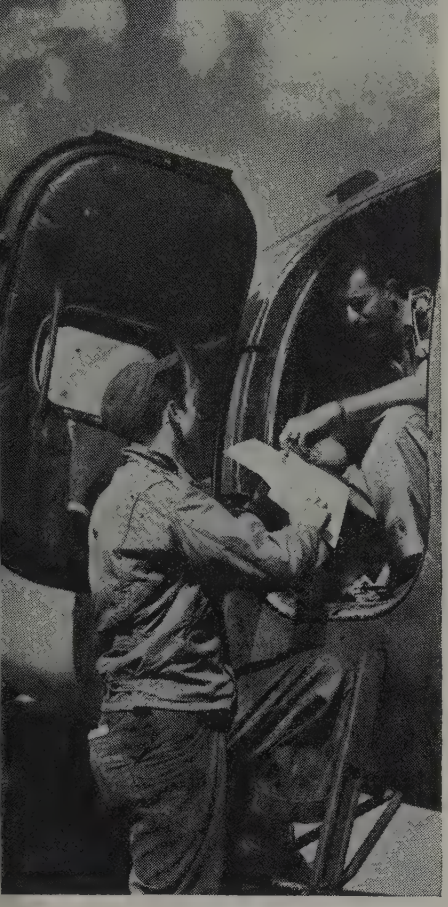
SAC's "Seeing-Eye" Jets

GIANT EYE, protuberant and bloodshot, identifies the RB-45C's of the USAF's 91st Strategic Reconnaissance Wing

MISSION completed, "Seeing-Eye" RB-45C *(above)* is greased in at Lockbourne AFB near Columbus, Ohio. At 45,000 feet, crew in an RB-45C can look over 30,000 square miles

JATO UNITS and alcohol-water injection into jet engines give the "Seeing-Eye" *Tornado* added power for take-off. Its crew consists of pilot, co-pilot and a photo-navigator

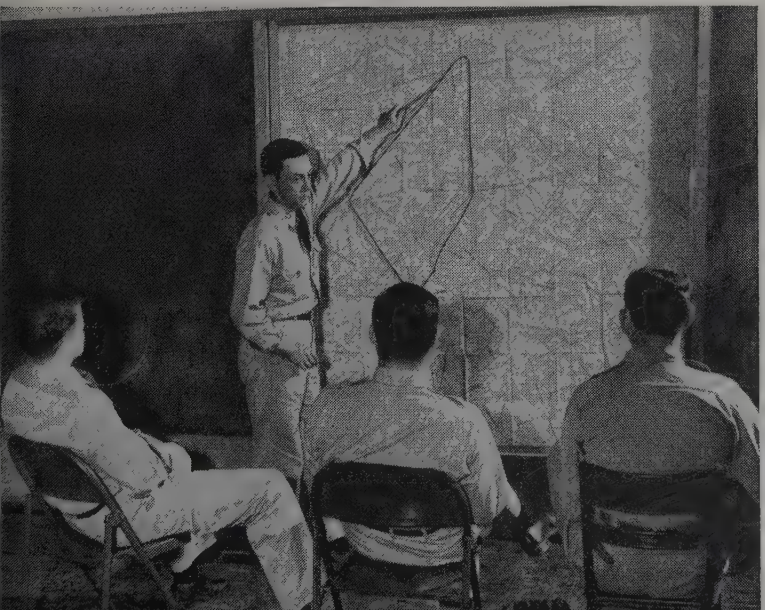
Camera boys of 91st Strategic Recon Wing photograph 48 states from 18 predetermined points



KEY MAN on a photo mission is the photo-navigator in nose of the RB-45C. Here he goes over 150 check operations with mech

CREWMEN mount one of *Tornado's* giant "eyes" in the nose. This camera, one of 11 mounted in the RB-45C, takes all oblique pictures. The 11 cameras are mounted at five stations

CREW of 91st Strategic Reconnaissance Wing jet *Tornado* is briefed before photo mission. A mission may require 11 or 12 hours flying time in the air, be over target 15 minutes



IF YOU draw a pencil line on a map from Seattle, Washington, to Columbia, South Carolina, and another from Bangor, Maine, to San Diego, California, they will intersect in mid-U.S.A., not far from Offutt Air Force Base, Omaha, Nebraska.

This is the headquarters and brains of the Strategic Air Command. But the restless eyes of SAC's boss, now General Nathan F. Twining, roam all over the world in an undisclosed number of sleek and swift new airplanes—the four-jet RB-45C's, manufactured by North American Aviation Inc. (*Ed. note*—Gen. LeMay, former SAC commander, is now Vice Chief of Staff of the Air Force.)

They're the "seeing-eye" jets of the U. S. Air Force's 91st Strategic Reconnaissance wing and they're on duty in the Far East. They carry 11 cameras mounted at five stations; they can operate in the 550-mph class and above 45,000 feet. World War II produced nothing that can even touch this brand-new "flying camera shop."

The RB-45C's are not hard to recognize. On the forward tip of each fuselage the crews have painted a single giant eye—slightly protuberant and bloodshot.

"The kind of thing that you might encounter in a nightmare or a Salvador Dali painting," one pilot said not long ago.

These planes are adaptations of the four-jet B-45 North American *Tornado*. They're designed to race over enemy-held territory on long-range day and night reconnaissance, on high and low-level photographic missions and on other special tasks.

The RB-45C's are powered by four General Electric J-47A jet engines, each with a static thrust of 5200 pounds, giving the plane a total of 20,800 pounds thrust and putting the 45 in the near-supersonic class. Added power is available for take-offs by the use of JATO units and alcohol-water injection into the jet engines.

With a maxium gross weight of 110,000 pounds, the RB-45C's have a service ceiling of more than 45,000 feet and a normal tactical radius of 1200 miles with the use of wing-tip tanks. Range can also be increased by the use

By Andrew Hamilton

of bomb bay tanks and by refueling in mid-air from KB-29 Tanker planes. Automatic fuel selectors aid the pilot by drawing from the plane's tanks evenly, equalizing the balance as fuel is consumed.

Additional flying aids, such as electrically controlled trim tabs and a hydraulic boost system to assist in the operation of flight controls reduce the amount of "pilot beef for stick forces." According to the men who fly them, the RB-45C's are "a pilot's pleasure." Their smoothness and vibrationless flight make them ideal as photographic platforms for sensitive cameras.

The "seeing-eye" jets have a crew of three: pilot, co-pilot, and photo-navigator. Pilot and co-pilot sit in tandem in a pressurized cockpit with dual controls. The photo-navigator sits forward in the nose and also acts as bombardier and radar operator. Catapult seats for the two in the cockpit and an escape hatch for the third member of the team make the plane easy to get out of in case of trouble.

RECCE-TECH experts critically examine a negative roll for quality. Some rolls of film are 390 feet long, and cost up to $56 apiece

The Air Force doesn't say how many RB-45C's it has in operation. However, an accelerated training program is presently underway for both flying crews and the technicians who process film brought back from photographic missions.

Headquarters for the 91st Strategic Reconnaissance Wing's world-wide operations is the Lockbourne Air Force Base near Columbus, Ohio. Under the command of Colonel Joseph H. Preston, it's on a round-the-clock operation and crews are on duty 10 hours a day, seven days a week. No member of an air or ground team can take leave singly. Either it's the whole crew or none at all. Feeding problems become so involved under this kind of a strict schedule that the 91st's mess is now run on a 24-hour basis.

A recent practice mission to map the area between Newark, New Jersey, and Parkersburg, West Virginia, began on the ground at Lockbourne Air Force Base. The flying time over the target was only 15 minutes, but it was preceded by several hours of preparation and followed by several more hours of inspections and interrogation. On other occasions, a mission may require 11 or 12 hours flying time in the air.

At the start of a flight, cameras are checked, loaded with film and placed in the plane. The 11 cameras are mounted at their five different stations —nine are operative, two ar held in reserve. Eight of the nine are visual and one is operated by radar.

The RB-45C can carry 10 different types of aerial cameras—including the K-22A still camera, the A-6 35-mm motion picture camera, the K-37 night camera and the brand new S-7A camera. All cameras are loaded with film rolls—some of them as much as 390 feet in length and costing up to $56 apiece.

The S-7A camera is especially designed for high-speed, low-level photographic missions. It is shutterless and semi-automatic, exposing film through an open slit adjustable to compensate for altitude and groundspeed. With such a camera, it is theoretically possible to fly from New York to Los Angeles and take one continuous strip picture of the United States. And by using a stereoscope, similar in principle to the kind in grandma's parlor, vivid three-dimensional color pictures of the terrain can be observed.

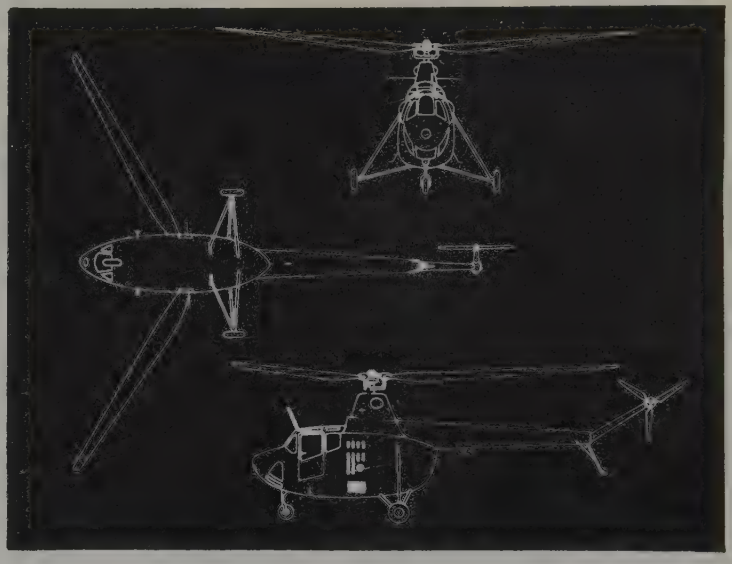
When the RB-45C is in the air on a photographic mission, the key man is the photo-navigator. And although aircraft engineers have tried to simplify his job, he's usually the busiest man of the crew. Focusing and camera-clicking are automatic, but he has some 150 check operations to tend to. Once he throws the switch that puts the cameras in operation, he can photograph from horizon to horizon. And when the flight is started, there is no way of going through the plane to check any trouble that might develop.

All necessary switches, indicator lights, exposure counter and intervalometers are on three control panels in front of him. With them he can operate by remote control all 11 cameras, either singly or in combination. *(Continued on page 52)*

RUSSIA'S three-seater Mil helicopter bears striking resemblance to U.S.' Bell H-12 and England's Bristol Sycamore

Russian Rotary Wing

By Wm. Green



MIL has conventional three-bladed main rotor and anti-torque rotor. Its fuselage comprises three sections: all-metal nose, center, fabric-covered tail

PRIOR to the helicopter's universal success in Korea, military interest in this type of aircraft had been intermittent and at times only lukewarm and the stimulus that would have come from large military contracts, such as have now been placed, was denied. The operational evaluation of the helicopter in Korea has not only resulted in the acceleration of its production in the U.S.A., Britain and France, the Soviet Union has also stepped up helicopter manufacture, and reports suggest that production in Russia, although only recently progressing from the experimental to the quantity production stage, will exceed that of U. S. helicopter manufacturers by the end of the year.

TsAGI, the Central Aero-Hydrodynamics Institute, at Moscow, has (*Continued on page 56*)

LANDING GEAR is fixed tricycle type with castoring nosewheel. Powerplant is 600- or 650-hp ASh-21 radial engine

Stolen Solo

Two teen-agers without any flight instruction prove cool heads lead to safety in operation

INSTRUMENT PANEL of the *Bonanza* was carefully charted and studied by the boys before their daring escapade that fateful dark and icy night. Both boys memorized the function of each button and control. They also made up two check lists to use after they were airborne. But the *Bonanza* they finally "borrowed" had a panel that was very different

PLOWED FIELD *(marked with an X)* adjacent to the South St. Paul airport was where the boys finally landed the "borrowed" *Bonanza*. Allan reported he set the plane down in this field because he was afraid of hitting a wire fence and a snow fence around the airport. His speed at the touchdown was 50 mph, his approach speed, about 100 mph. Plane was undamaged

According to all logic and experience, the two boys involved in this "crime" should have crashed and been killed. Probably any other boys who might try to emulate them would be. We believe that Allan and Bob got away with it safely because of two primary reasons: 1) they did a lot of preparatory studying; and 2) they remained cool and collected throughout the flight and thus were able to make logical decisions. In most cases of involuntary instrument flying, panic takes over the controls from the pilot and the airplane starts doing aerobatics. Note that no involuntary maneuvers occurred during the flight described in this article.

As a service to pilots, SKYWAYS publishes this interesting true story as a part of its continuing campaign for greater air safety.—Ed

by Gerald B. Smith

Aviation Editor, St. Paul Dispatch and Pioneer Press

Many persons in aviation circles still are unwilling to give the Associated Press credit for telling the truth in the recent story, carried nationwide, about the two untrained 'teen-age boys who stole a Beech *Bonanza*, flew it at night in nasty weather, and landed it without accident alongside the dark airport from which they had taken off.

I have been asked to answer most of the questions posed by the doubters, because I was the only aviation reporter given opportunity to interview the two boys after their weird and unorthodox flight—accomplished the hard way in a "borrowed" airplane.

According to Minnesota law, the youngsters must be allowed to remain anonymous. They have appeared in juvenile court in Dakota county, Hastings, Minn., where the charge against them was operating an airplane without the owner's consent. Both boys were placed on probation under the direction of the St. Paul juvenile authorities, and will report regularly on their activities for a period of a year.

Judge Edward J. Hiniker, pointing out the necessity for protesting the identity of juveniles, said:

"Our statutes provide that any disposition of a child dealt with for delinquency, as well as evidence given in such cases, shall not be evidence against such child for any purpose, and further provide that the general public be excluded from the room wherein a 'delinquency' hearing is held. and that the records of all such cases be withheld from indiscriminate public inspection.

"I presume that withholding the names of juvenile delinquents or alleged delinquents from publication is a matter of policy with newspapers, and I consider this a commendable practice."

So, in spite of the fact that the youngsters themselves have never been named publicly, their 'feat' of flying a fast, high-powered airplane on a dark, icy night, and miraculously surviving to tell the complete story of their escapade, is a matter of record and completely documented.

Jack Lysdale, manager of the South St. Paul municipal airport, Fleming Field, was alerted by police during the low approaches of the airplane over communities south- (*Continued on page 44*)

OWNER of flying service from which plane was taken is Ben Wiplinger, shown here in front of *Bonanza's* hangar

Trained Technicians...

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Planes of the USAF

On the following pages you will see some of the tools which your United States Air Force uses to perform its mission in the program for world peace.

These planes are not a mere collection of metals and mechanical parts. They are the end product of our best scientific minds, our planners, and our craftsmen. The complexity of modern aircraft demands the utmost in engineering skill and perfection in materials and workmanship.

The cost of such equipment is large—both in dollars and hours of manpower. This is the price we pay for strength, and strength is our only hope of purchasing peace under threatening world conditions.

The American people have made it clear they will not tolerate aggression. Our people are willing to pay any necessary cost to preserve our way of life and our freedom.

The Air Force recognizes the grave responsibility it has—to make sure that the Air Force portion of the defense dollar provides the maximum in efficiency and strength. Our airmen and civilian workers are constantly aware of this duty to their fellow citizens and to other freedom-seeking people of the world.

These planes, and the men and women who make them possible, are a primary element of our national defense team. This team, with the support of the American people and our international allies, will continue to protect our freedom—through unity and strength.

Hoyt S Vandenberg

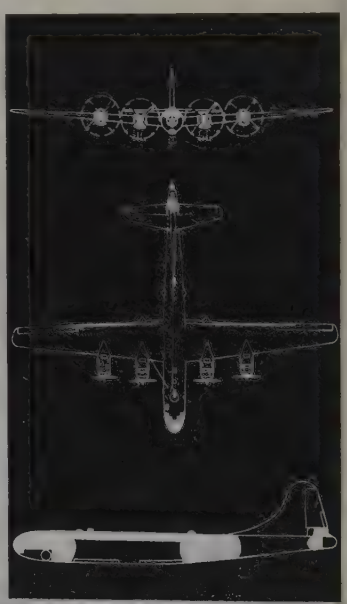
General, Chief of Staff, USAF

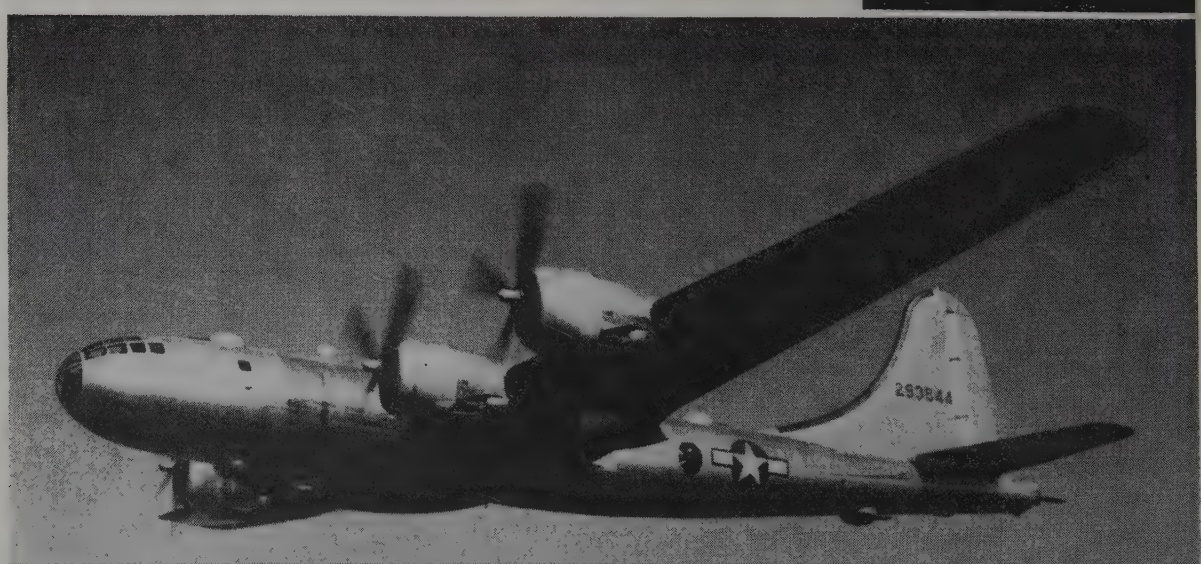
Special Section

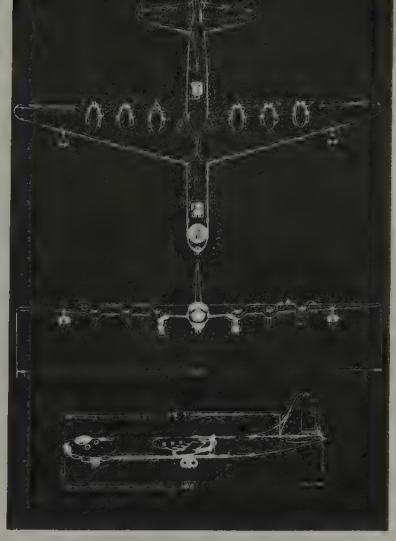
DOUGLAS B-26 Attack Bomber has been a mainstay in low-level ground-support work in Korea. Powered by two Pratt & Whitney R-2800 engines of 2,000 hp each, the B-26 has top speed of 370 mph, a service ceiling of over 28,000 feet and a combat radius of more than 900 miles. Called *Invader,* it carries a crew of three, a 6,000-pound bomb load, is armed with 16 .50-cal guns. Although considered obsolete in light of our jet air force, it is current standard USAF Light Bomber.

BOMBERS

BOEING B-29 is on duty today as a Medium Bomber ranging over the mountains of Korea. Powered by four Wright R-3350 engines of 2200-hp each, the *Superfortress* has a top speed of about 400 mph, a service ceiling of more than 35,000 feet, and a combat radius of over 2100 miles. It carries a crew of 11 and has a 20,000-pound bomb load. Other visions are RB-29A for reconnaissance, SB-29 search-rescue, KB-29 tanker.

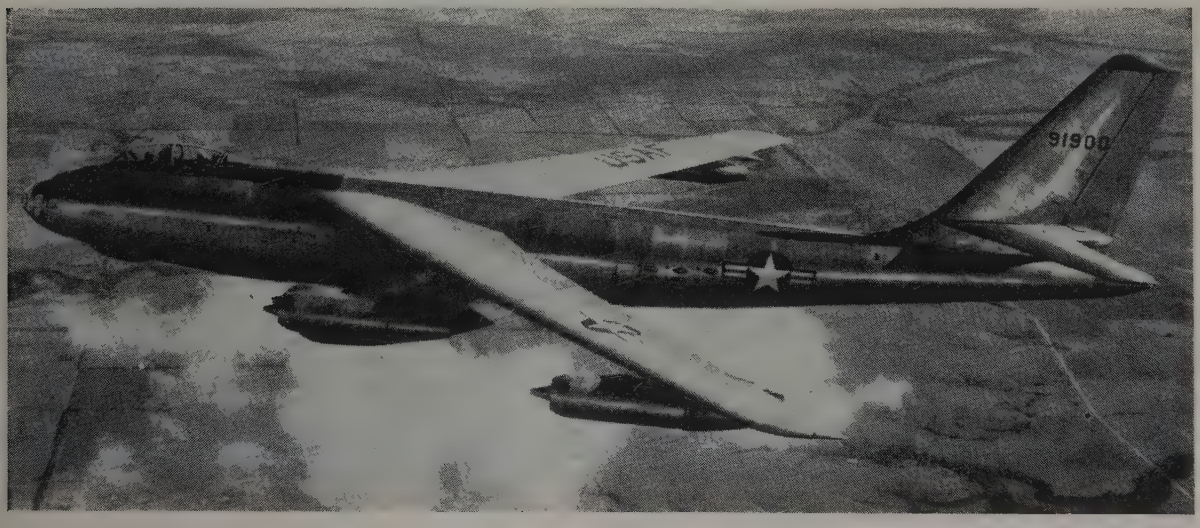






CONSOLIDATED B-36 is the Air Force's Heavy. Powered by six Pratt & Whitney R-4360 engines of 3500 hp each and four J-47 jet units of 5200 pounds thrust each, the B-36 has top speed of more than 435 mph, ceiling over 45,000 feet, and range over 10,000 miles with 10,000 pound load dropped midway. It carries crew of 16. F version has increased horsepower due to new R-4360-53 engines.

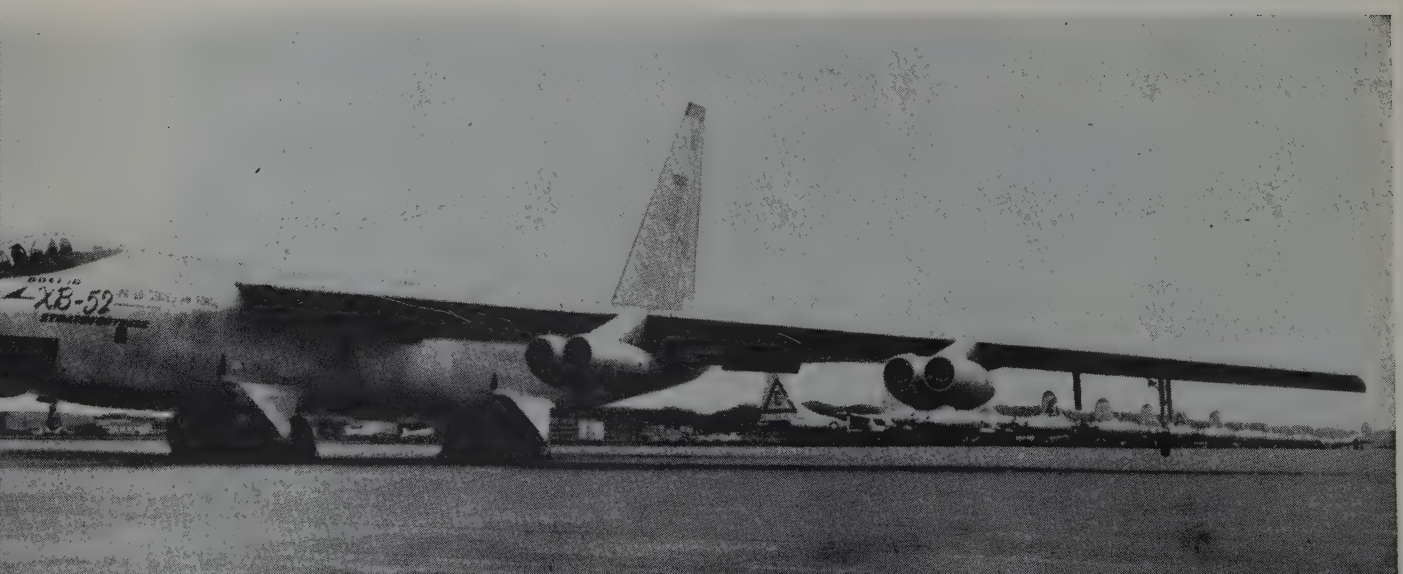
BOEING B-47 (*below*) is Medium Bomber powered by six General Electric J-47 jet engines of 5800 pounds thrust each. Called *Stratojet*, it carries crew of three, is in the "600-mph class," and has a service ceiling over 40,000 feet. It has a 3,000-mile range and a bomb load of more than 20,000 pounds. It has wing sweepback of 35°. Eighteen Rato units add extra 18,000 pounds thrust: 9 units on each side.



BOEING B-50 is Medium Bomber powered by four Pratt & Whitney R-4360 engines of 3500 hp each. It has top speed of more than 400 mph and a total bomb capacity of 28,000 pounds. Developed from the B-29, the B-50 has a normal range of more than 6,000 miles, a gross weight of 164,-500 pounds. Bomber features latest in radar and radio equipment, all-plexiglas nose section, and provisions for in-flight refueling. The B-50 carries a crew of 11 men.

MARTIN XB-51 is a Tactical Bomber powered by three GE J-47 turbojets each producing 5200 pounds thrust. It features sharply sweptback wings with changeable angle of incidence, outrigger wheels near wing tips to give balance during take-off, landing, and parachute "brake" for quick stops. In addition, provisions have been made for Rato for extra thrust for take-off. The XB-51 carries a crew of two and has a top speed in excess of 600 mph. Cabin of the Light or Tactical bomber is both pressurized and refrigerated. It has been "experimental" since October, 1949, and is undergoing further AF testing.

BOEING XB-52 is still a very hush-hush Heavy Bomber. It is powered by eight Pratt & Whitney J-57 turbojet engines and has been named *Stratofortress*. This big tandem-geared bomber is a progression of the B-47 *Stratojet* design and is said to have a gross weight in the neighborhood of 300,000 pounds. All other details of the XB-52 are classified. The photograph presented here (*below*) is the only one released by the U.S. Air Force to date. It was made public by the Air Force when the XB-52 was brought out of "hiding" for engine run-ups at Boeing Field. It had been under camouflage since leaving the factory.



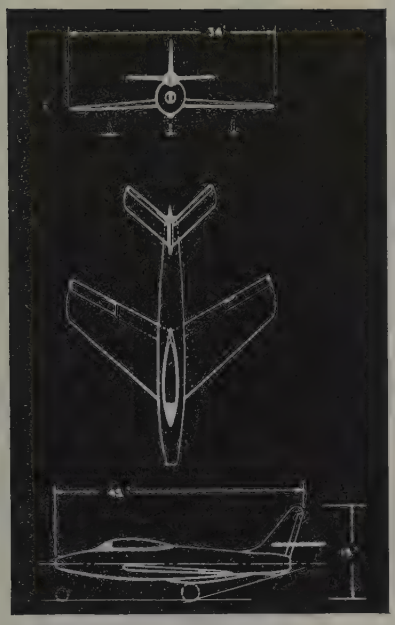
MARTIN B-57A is a Night Intruder version of the British-developed *Canberra.* The twin-jet bomber with the straight stubby wings is powered by two Wright J-65 turbojets of 7200 pounds thrust each. Its top speed is estimated to be over 600 mph. Features of the B-57 include cabin pressurization, ejection seats, finger-type brakes outboard of the nacelles which slow down the airplane during a dive without requiring additional trim by the pilot. Wing-tip tanks may be added. The engines that power the B-57A are the American version of the Armstrong Siddeley *Sapphire*, built in the U.S. under license. Because of the re-engineering involved in adapting a British design to U.S. standards, the B-57A probably will not be available in quantity until 1953 or 1954.

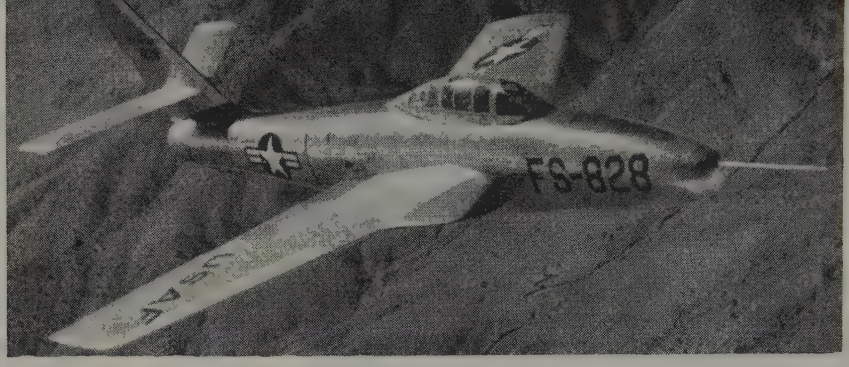
MARTIN B-61 *Matador* is the U.S. Air Force's first pilotless bomber. It is currently under advanced development at the AF Missile Test Center at Cocoa, Florida. Powerplant for the B-61 is said to be the Allison J-33 with a thrust rating in the "5200-pounds" class. Speed of the *Matador* is "over 600 mph." In test flights over the Atlantic from Cocoa, the B-61 is tracked by radar stations down range, telemetering information back to the base. The *Matador* is shown here (*right*) on its launching platform and ready to take off.

FIGHTERS

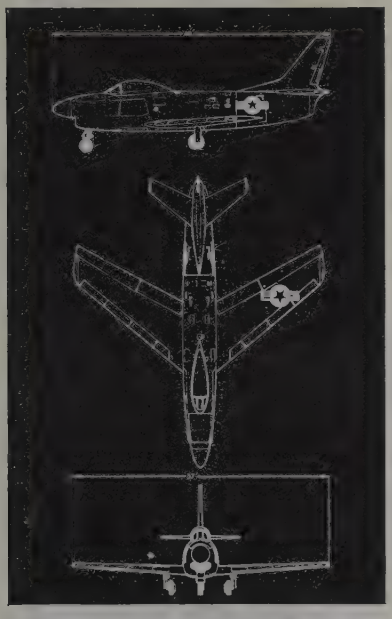
LOCKHEED F-80 is the Air Force jet fighter that delivered the goods in Korea. Without it at the start of the conflict in Korea, the upper hand might still be on the side of the Communists. Powered by an Allison J-33 of more than 5200 pounds thrust, this single-seater has a top speed of more than 600 mph, a combat radius of more than 500 miles, a service ceiling of over 45,000 feet. *Shooting Star* can carry two, 1,000-pound bombs or eight five-inch HVAR wing rockets or napalm tanks.

REPUBLIC F-84G is first operational jet fighter to roll off production line equipped for mid-air refueling. The 'G' can be completely refueled in two and a half minutes. The single-point receptacle which receives the refueling boom can be seen on the inboard leading edge of the wing (*above*). The F-84G is powered by Allison J-35 of 5600 pounds thrust. It has combat radius of over 1,000 miles with external tanks, a speed in the 600-mph class, a service ceiling of over 45,000 feet, a gross take-off weight of 18,000 pounds. Refueled in air four times, 'G recently flew 12 hours.

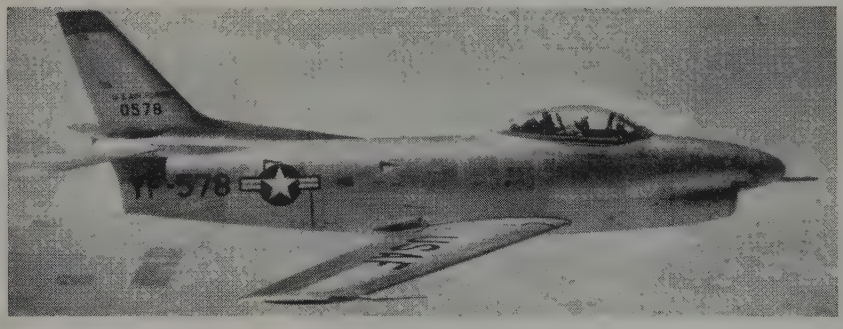




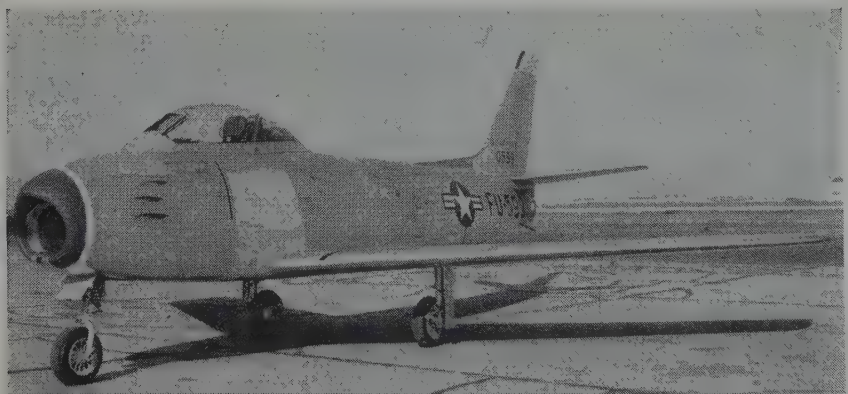
REPUBLIC RF-84F is a sweptwing development of the F-84. Powered by a Wright J-65 turbojet engine of 7200 pounds thrust, the RF-84F is "over 600 mph" and faster than the F-84E which is also listed as "over 600 mph." It has a service ceiling more than 45,000 feet and a combat radius of more than 850 miles. A single-seater, it carries two 2,000-pound bombs or four 1,000-pound bombs. Armament consists of six .50's and 32 five-inch rockets. The RF-84F carries more fuel than the 'E', having additional internal wing tanks. The jet fighter also carries two 450-gallon external wing tanks. It has a wing span of 33 feet 7 inches.

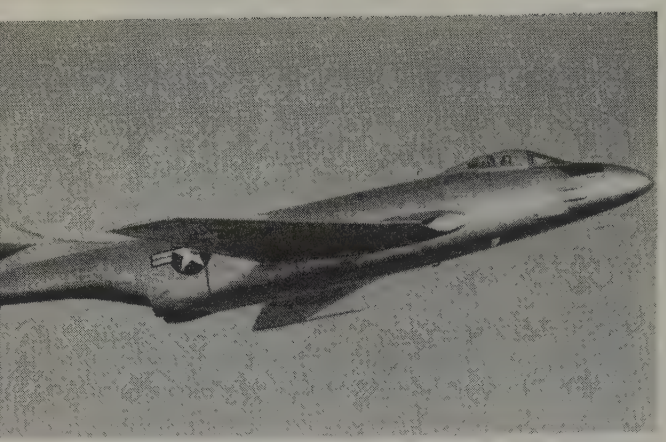


NORTH AMERICAN F-86D is an Interceptor powered by a GE J-47 with afterburner. It was designed to climb quickly to extreme altitudes for interception. Intake duct under the nose instead of in the nose permits installation of radar. Speed of the F-86D is given as in "650-mph class," combat radius, about 500 miles. The F-86F and H are also in production, and are faster than the 'D' and have a greater combat radius than the 'D'. Armament on the F-86D consists of 24 "Mighty Mouse" rockets under wings. F-86F is powered by GE J-47-27 unit.

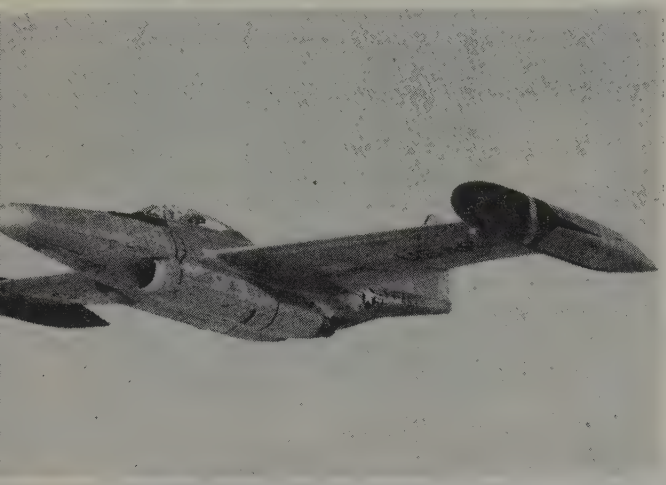


NORTH AMERICAN F-86E *Sabre* is the jet that's been taking the measure of the Red Migs in Mig Alley in Korea. Powered by a J-47 of 5200 pounds thrust, the famed *Sabre* is in the 650-mph class, has a service ceiling of more than 45,000 feet, and a combat radius over 500 miles. Its maximum bomb load is two 1,000-pounders, and its armament consists of six .50's and 16 five-inch HVAR rockets under the wings. The wing and tail assembly of the F-84E have a sweepback of 35°. It has a wing span of 37 feet 1 inch, is 37 feet 5 inches long. (The 'D' model is 41 feet 8 inches long.) Its maximum take-off weight is 16,000 pounds.

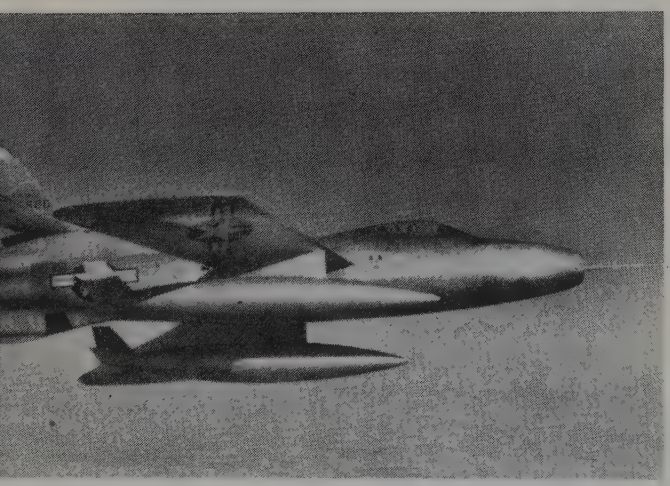




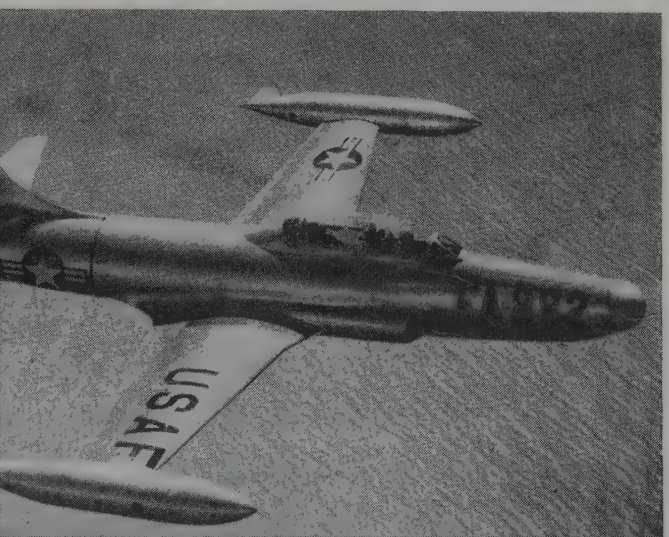
MCDONNELL XF-88 is a Penetration fighter powered by two Westinghouse J-34-WE-15 engines, each rated at 4,000 pounds thrust with afterburner. A single-seater, it is estimated by some to have a top speed in the vicinity of 700 mph, a ceiling of over 45,000 feet and a range of more than 1,000 miles. These figures are not official. Called *Voodoo*, it has a 35° wing sweepback and ejection seat.



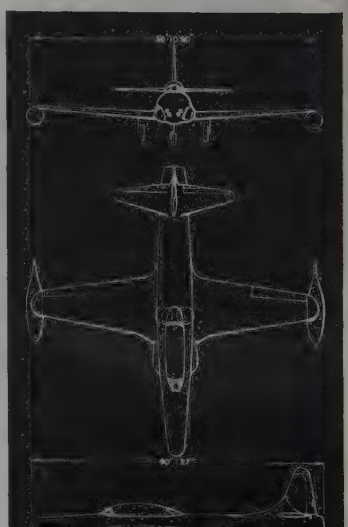
NORTHROP F-89D is an All-Weather Interceptor powered by two Allison J-35 jet engines rated at 5,000 pounds thrust with afterburner. Carrying a pilot and radar operator, the F-89D is in 600-mph class, has a service ceiling of more than 45,000 feet and a combat radius of approximately 500 miles. It has bomb load of 3200 pounds, is armed with six 20-mm's.



REPUBLIC XF-91 is an Interceptor with an extremely high rate of climb. Powered by a GE J-47 turbojet of 5200 pounds thrust and one Reaction Motors XLR-11-RM-9 rocket, the XF-91 is a very-high-speed fighter estimated by many to be in the 800-mph class. It features Inverse Taper, variable incidence wings, tricycle gear with the main gear in tandem, and pressurized and refrigerated cockpit.



LOCKHEED F-94B is an All-Weather Interceptor designed to protect the U.S. from enemy bomber invasion. Powered by an Allison J-33 turbojet of 5200 pounds thrust, the F-94 is in the 600-mph class, has a service ceiling of more than 45,000 feet and is armed with four 50's. It carries two 1,000-pound bombs or eight rockets. A modification of the T-33, it is equipped with radar and carries a radar operator.

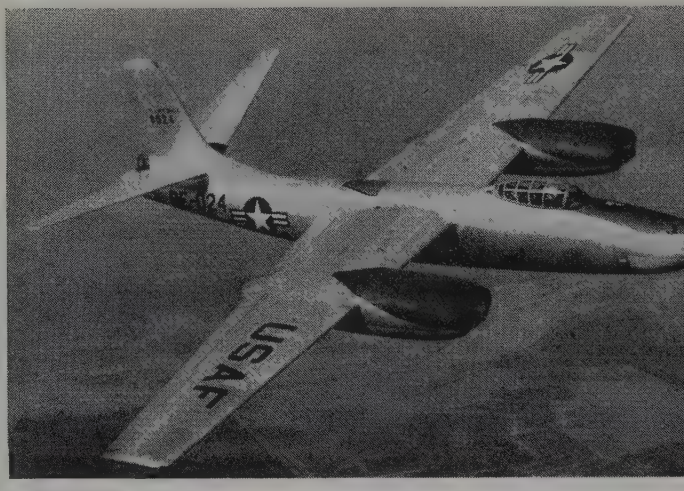


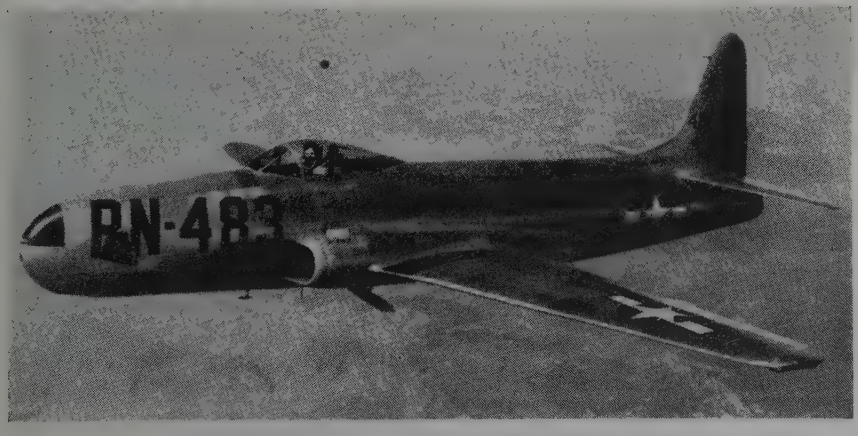
Special Purpose

FLETCHER FD-25 is a low-wing single-placer designed for close ground support. Powered by a Continental E-225-8 engine of 225 hp, it has a cruising speed (sea level) of 162 mph, a top speed of 187 mph, a service ceiling of 16,500 feet and a range (at cruising) of 630 miles. It is of all-metal construction and has a fixed landing gear. It has a low landing speed of 35 mph and a rate of climb of 1,725 fpm. A two-place tandem version has been built for liaison.

BOEING KC-97A is a triple-purpose *Stratofreighter*. It is a double-deck troop and cargo airplane convertible for use as an aerial refueling tanker plane equipped with Boeing Flying Boom refueling equipment. As a troop carrier, it carries 135 men; 83 litter patients, medical attendants and supplies as a hospital plane; and 68,000 pounds cargo as short-haul freight plane. Powered by four Pratt & Whitney R-4360 engines of 3,250 hp each, the C-97 or KC-97 has a top speed over 350 mph, a service ceiling over 35,000 feet and a combat radius over 1100 miles, has crew of 5.

NORTH AMERICAN RB-45C is a high-altitude photo reconnaissance jet powered by four GE J-47's of 5200 pounds thrust each. A photo version of the *Tornado* Light bomber, it has a top speed of approximately 550 mph, a ceiling of more than 45,000 feet and a combat radius of more than 800 miles (over 1200 miles with tip tanks). Some carry four Rato units for additional take-off power.

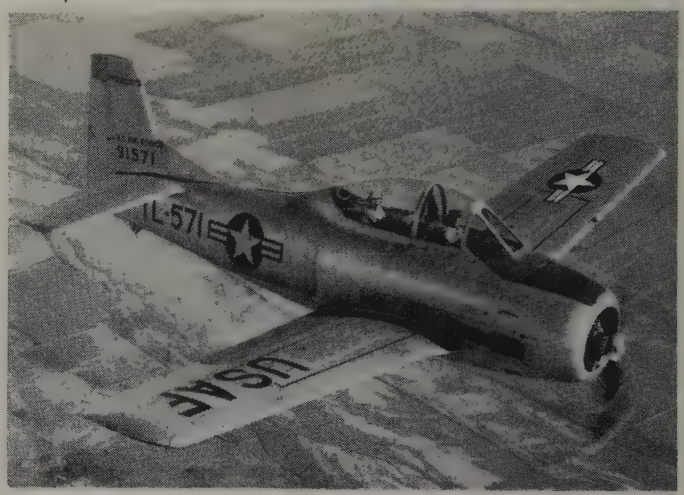




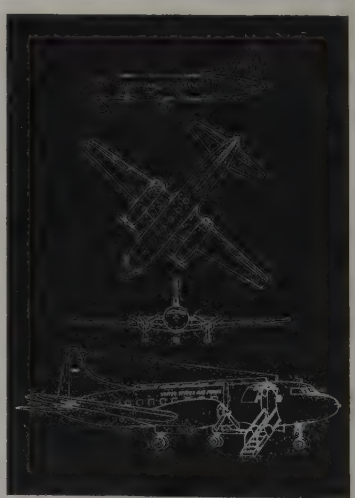
LOCKHEED RF-80 is the Air Force photo version of the F-80 *Shooting Star*. Called Tactical Reconnaissance version, the RF-80 is powered by an Allison J-35 turbojet of more than 5200 pounds dry static thrust. Like the F-80, it is in the "600-mph class," has a combat radius of more than 500 miles. The RF-80 has one 435-gallon internal fuel tank and two 165-gallon external tanks.

GRUMMAN SA-16A is a multi-purpose plane, used as a personnel and cargo transport, search and rescue, and as seaplane trainer. Powered by two Wright R-1820 engines of 1,425 hp each, it has a top speed of more than 250 mph, combat radius of 1,150 miles, seats 10 passengers or 12 litters, has crew of six.

NORTH AMERICAN T-28 is a primary and basic trainer powered by a Wright R-1300 engine of 800 hp. It has a top speed of more than 285 mph, a ceiling of more than 25,000 feet, a combat radius of over 300 miles. It features tricycle landing gear, power-operated canopy, and heating cabin.

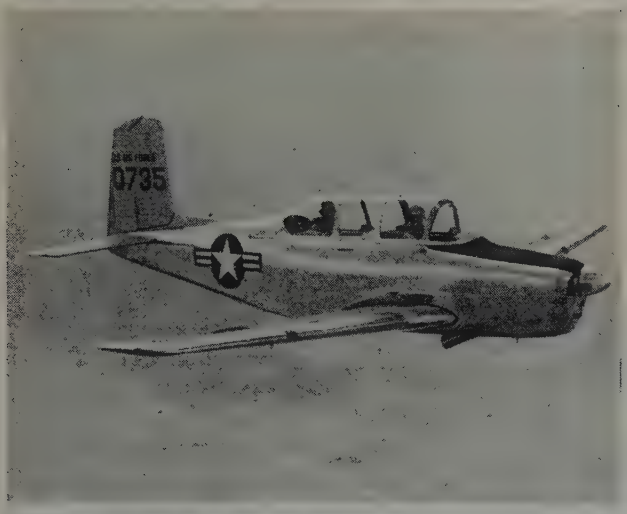


CONSOLIDATED VULTEE T-29B, an adaptation of the Convair-liner, is a navigational trainer powered by two Pratt & Whitney R-2800 engines of 2100 hp. It features 14 training stations for radar and navigation students and instructors. It has top speed over 300 mph, a range of about 2,000 miles.

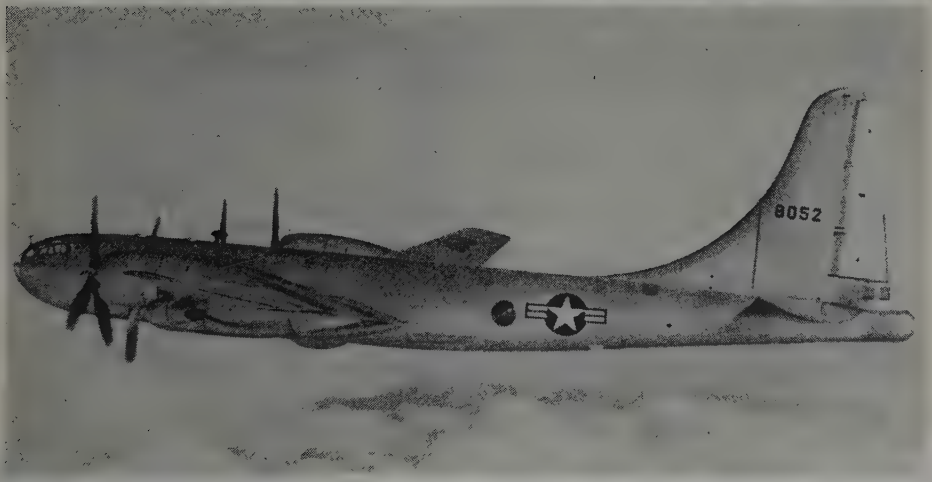


LOCKHEED T-33 is trainer version of the famed F-80 jet fighter. Powered by an Allison J-33 of over 5200 pounds thrust, the two-place T-33 is in the 600-mph class, has combat radius of about 500 miles without tip tanks. It features dual controls, ejection seats, pressurization, refrigeration, and Rato units for extra power.

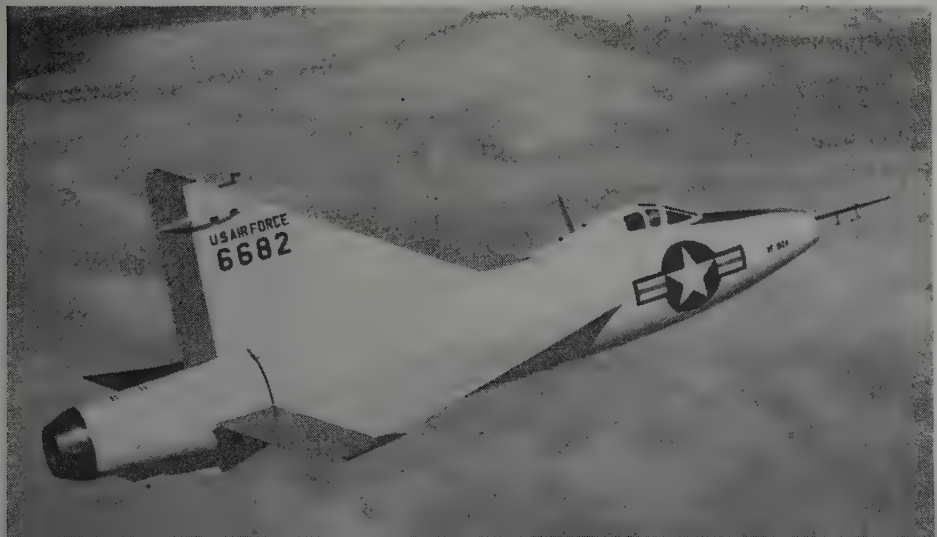
TEMCO YT-35 is a trainer powered by Franklin 6A4-165 engine rated at 165 hp. Called *Buckaroo*, it has top speed of 155 mph, a service ceiling of more than 20,000 feet and a range of 550 miles. The trainer carries pilot and student, and is equipped with full blind-flying instruments. It has retractable main gear, retractable flaps.



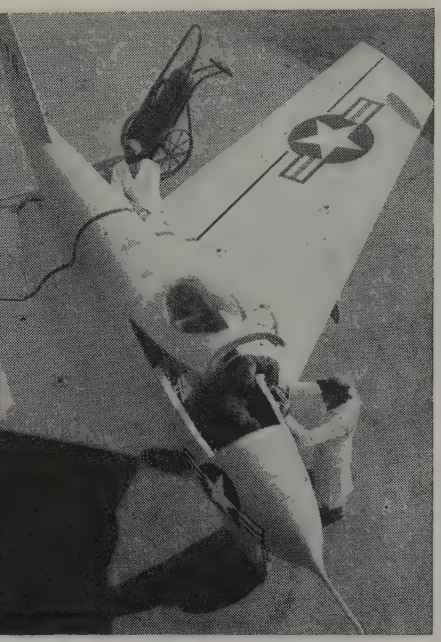
BEECH T-34 is an all-metal two-place all-purpose trainer powered by Continental E-225 engine rated at 225 hp. It has a top speed of more than 180 mph, a service ceiling over 20,000 feet, a range of 580 miles. It carries full night-flying equipment and, like the YT-35, has no aerobatic restrictions. It has a gross weight of 2700 pounds.



BOEING TB-50D is a triple-threat trainer version of the *Superfortress*. This four-engined, 154,000-pound training ship is equipped with new and secret radar-navigation and bombing instruments for training "triple-threat" crewmen for jet bombers. It is powered by four Pratt & Whitney R-4360 engines, has top speed of 400 mph.



CONSOLIDATED VULTEE XF-92A is a delta wing high-speed research plane, rumored to be prototype of new delta wing XF-102 fighter. An interceptor, the XF-92A is powered by J-33 with afterburner, has a speed rated as "high sub-sonic," and a ceiling of more than 45,000 feet. It features wing sweepback of 60°.



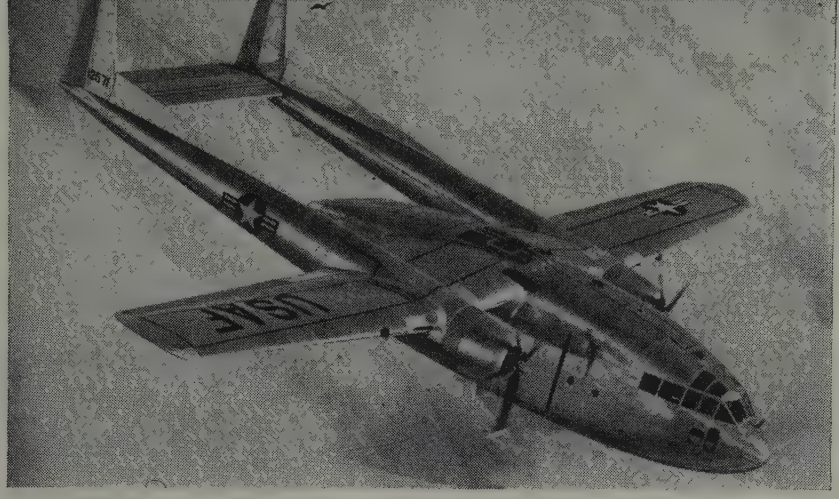
NORTHROP X-4 is semi-tailless research plane powered by two Westinghouse J-30 turbojets rated at 1600 pounds thrust each. It has top speed of about 650 mph at 10,000 feet; seats one, has wing span of 26 feet 10 inches.

BELL X-5 *(above)* features wings, sweepback of which can be varied in flight. It is powered by Allison J-35 engine of 4900 pounds thrust; has estimated top speed of approximately 600 mph has wing span of 32 feet 9 inches.

Transports

CONSOLIDATED VULTEE XC-99 is a cargo-transport powered by six Pratt & Whitney R-4360 engines of 3500 hp each. It has 300-mph top speed, a range of 8,000 miles with 10,000 pounds of cargo. A double-deck cargo adaptation of the B-36, the XC-99 has a fuel capacity of about 21,116 gallons.

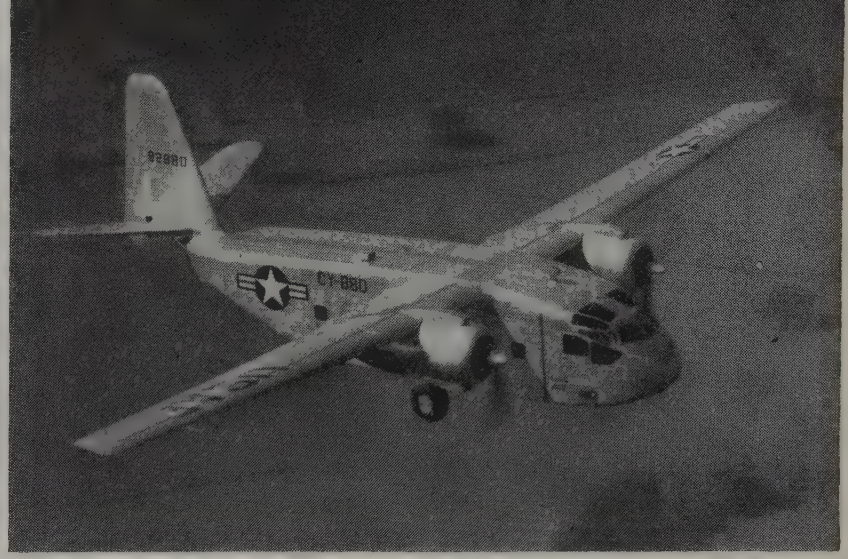
FAIRCHILD C-82 is a Troop Carrier used for dropping paratroopers and paracontainers. Powered by two Pratt & Whitney R-2800 engines (2100 hp each) the *Packet* cruises at 170 mph, has a combat radius of 1,150 miles. Cargo capacity is 24,000 pounds (maximum) or 42 troops plus supplies, etc.



FAIRCHILD C-119 is a development of the C-82. Used as a troop carrier in Korea, the C-119 (*above*) is powered by two Pratt & Whitney R-4360 engines, has top speed over 250 mph, a combat radius of 1100 miles with 10,000 pound load; crew of five.

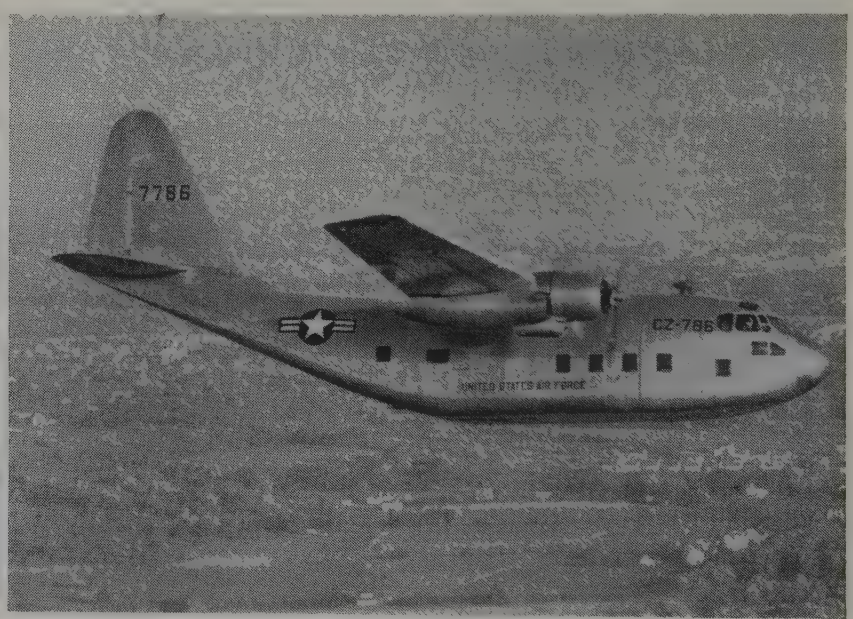
FAIRCHILD XC-120, a major modification of the C-119, has detachable cargo pod. Called *Packplane,* it is powered by two Pratt & Whitney R-4360 engines; has speed over 250 mph, a design range of 1500 miles with 10,500 pounds cargo; crew of five.

LOCKHEED C-121 is military transport version of *Constellation.* Powered by four Wright R-3350 engines of 2500 hp each, the C-121 has top speed of 350 mph, combat radius of over 1100 miles. Maximum load is 43,300 pounds, or 44 passengers, or 20 litters plus four attendants and 20 passengers. C-121 uses a crew of five and four relief crewmen.



CHASE C-122 is a twin-engine troop and cargo-carrying transport, a modified CG-18 glider with engines. It is powered by two Wright R-1820 engines of 1,425 hp each and has a top speed of 220 mph, a range of approximately 2,000 miles and a service ceiling of 23,000 feet. It has cargo capacity of 12,000 pounds or 30 troops or 24 litters, attendants.

CHASE C-123 is an assault transport designed to carry troops and equipment. Powered by two Pratt & Whitney R-2800 engines of 2100 hp each, the C-123 (*below*) cruises at over 200 mph, has a range of more than 2500 miles and a service ceiling over 30,000 feet. It has a cargo capacity of 20,000 pounds or 60 equipped troops or 50 litters, etc.



DOUGLAS C-124A is a four-engine transport designed to carry heavy Army equipment. It is the only cargo plane that can carry the M-24 tank. Powered by four Pratt & Whitney R-4360 engines, it has top speed over 30 mph, combat radius of more than 1100 miles, cargo load of 74,000 pounds. C-124A carries a crew of 5.

Helicopters

BELL H-12 is a rescue helicopter designed to carry six litters plus one attendant or 10 passengers. Powered by Pratt & Whitney R-1340 engine of 600 hp, the H-12 has 105-mph top speed and a range of approximately 400 miles. It has a service ceiling of 13,000 feet and a useful load of 2200 pounds. Some versions of the H-12 are equipped with flotation gear for water, snow, ice or marsh operations. Another feature is its built-in hydraulic rescue hoist. It has a rotor span of 47 feet 5 inches, is 58 feet 8 inches in length, and 14 feet 3 inches in height. Has 450-fpm rate of climb.

BELL XH-15 is a light liaison helicopter designed for artillery use. It is powered by a Continental X0-470-5 engine of 285 hp which gives it a speed over 100 mph and a combat radius of approximately 100 miles. It has a service ceiling of 20,000 feet and carries three passengers. The XH-15 has a rotor span of 37 feet 4 inches, is 44 feet 9 inches in length and is 11 feet in height, Its gross weight is 2,797 pounds. It features provisions for float gear. The Air Forces plans to use the H-15 for observation, communication and photographic work. The XH-15 helicopter is of all-metal construction.

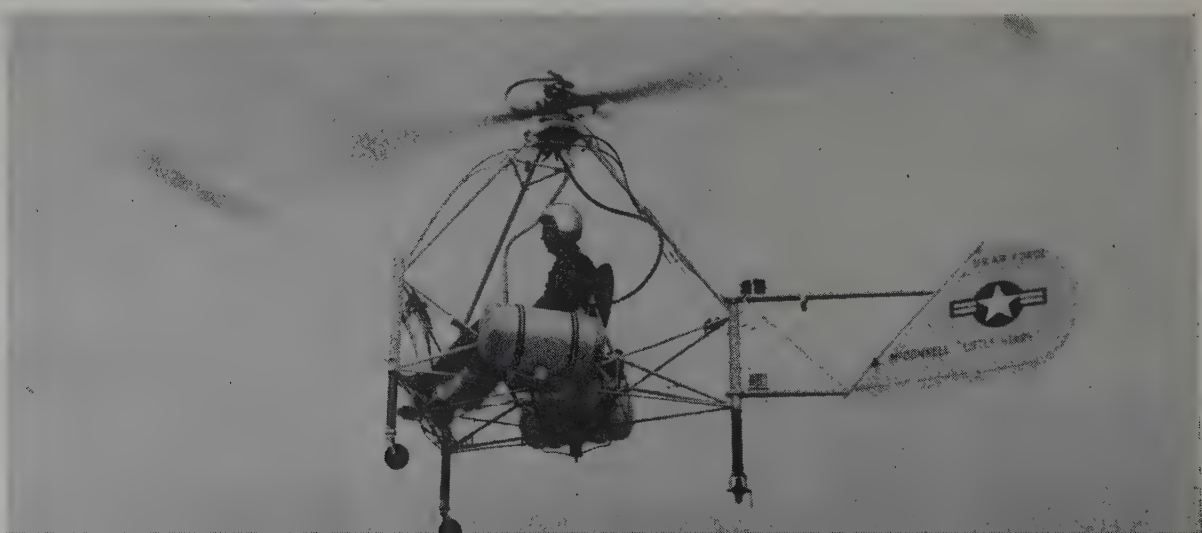
PIASECKI XH-16 is expected to be one of the largest rotary-wing types ever built, and capable of the longest range ever achieved by a helicopter. A twin-tandem rotored 'copter, the XH-16 is powered by two Pratt & Whitney 2180 engines of 1,650 hp each. Its all-metal fuselage has the dimensions of a C-54 and features a detachable compartment. It has an estimated cargo capacity of 40 troops or 24 litters. The XH-16 was designed originally to meet requirements for long-range rescue helicopter, is now utility 'copter.

HUGHES XH-17 (*above*) is an experimental heavy-lift jet helicopter, originally developed by Kellett, then purchased from Kellett by Hughes Aircraft. It is believed to be powered by two modified GE J-35 turbojet units delivering 4,000 pounds thrust each. This 'copter was designed for external attachment to cargo. No details available now.

SIKORSKY H-18 is an Army Field Forces reconnaissance, evacuation and liaison helicopter. Powered by Franklin Aircooled Motors 0-425 engine of 245 hp, the H-18 has cruising speed of 91 mph, top speed of 111 mph and a normal range of 306 miles. It has an initial rate of climb (at gross weight) of 1,050 fpm. It carries three passengers plus pilot.

SIKORSKY H-19 is a Search and Rescue 'copter developed from the earlier H-5H. Powered by Pratt & Whitney R-1340 engine rated at 600 hp, it has a top speed of more than 120 mph, cruises at 90, and has a combat radius of over 200 miles. It has an initial rate of climb of 1,130 fpm and a ceiling over 20,000 feet. It carries 10 passengers.

MCDONNELL XH-20 is an experimental ramjet-powered helicopter that is still undergoing tests and further experimentation. Built to seat one or two, it is reported to have a top speed of 50 mph. The small ramjet units are mounted at the tips of the helicopter's rotor blades. This experimental model XH-20 has a gross weight of just 680 pounds.



PIASECKI H-21 is a Rescue-Transport helicopter powered by Wright R-1820 engine of 1,425 hp. Built to carry a crew of two plus 12 litters and one attendant or 20 troops, the H-21 has a top speed of more than 140 mph, a service ceiling of more than 20,000 feet and a combat radius of 300 miles. Tandem-rotored, it is an all-metal arctic rescue helicopter with landing gear which incorporates wheels, floats and skis.

HILLER H-23 is a three-place helicopter powered by a Franklin Aircooled Motors 0-335 engine of 178 hp. It has a top speed of 84 mph, a service ceiling of 13,000 feet and a range of 210 miles. Designed to carry two litters plus a pilot, the H-23 has a gross weight of 2400 pounds, is transportable in a C-119. It features amphibious landing gear.

DOMAN YH-31 is intended for medical evacuation, front-line observation and reconnaissance, wire laying and aerial resupply. In its normal military configuration, the YH-31 will retrieve two litter patients from a point 240 miles distant. Helicopter's crew for such a mission will be pilot and attendant. For shorter hauls the cabin accommodates four.

U. S. Air Force Plane Facts and Figures

Mfg.	Desig.	Type	Crew	Powerplant	Horsepower or Lbs Thrust	Speed	Ceiling	Range or Combat Radius	Span	Length	Height
Beech	YT-34	Trainer	2	Cont. E-225-8	225 hp	180**	20,000 +	580 R	32'10"	25'11"	9'7"
	T-36	Trainer	3	2 P&W R-2800	2300 hp	300 +**	34,000	650 + CR	70'	52'2"	21'5"
Bell	X-2	Research	1	CW Rocket	15,000 lbs T	2000 +					
	X-5	Research	1	All. J-35	4900 lbs T	500 +			32'9"	33'5"	12'
Boeing	B-29	Med. Bomber	11	4 Wr. R-3350	2200 hp	400**	35,000 +	2100 CR	141'3"	99'	27'9"
	B-47	Med. Bomber	3	6 GE J-47	5800 + lb T	600*	40,000 +	3000 R	116'	106'8"	28'
	B-50D	Med. Bomber	11	4 P&W R-4360	3500 hp	400 +	40,000	2300 + CR	141'3"	99'	32'8"
	TB-50D	Trainer	13	4 P&W R-4360	3500 hp	400 +	40,000	6000 R	141'3"	99'	32'8"
	XB-52	Heavy Bomber	..	8 P&W J-57							
	KC-97	Tanker	5–7	4 P&W R-4360	3250 hp	350 +	35,000 +	1100 + CR	141'3"	110'4"	38'3"
Consolidated Vultee	T-29B	Trainer	3	2 P&W R-2800	2100 hp	300**	28,000 +	850 CR	91'9"	74'8"	26'11"
	B-36D	Heavy Bomber	16	6 P&W R-4360 4 GE J-47	3500 hp 5200 lb T	435 +	45,000 +	4000 + CR	230'	162'1"	46'8"
	XF-92A	Interceptor	1	All. J-33	5200 + lbs T	High Subsonic	45,000 +		31'3"	42'5"	17'8"
	C-99	Transport	5	6 P&W R-4360	3500 hp	300**	40,000	8000 R①	230'	182'6"	57'6"
Douglas	B-26	Light Bomber	3	2 P&W R-2800	2000 hp	370**	28,000 +	900 CR	70'	50'10"	18'6"
	C-124	Transport	5	4 P&W R-4360	3250 hp	300 +	30,000 +	1100 + CR	173'4"	127'1"	48'4"
Fairchild	C-82	Transport	5	2 P&W R-2800	2100 hp	170***	23,000 +	1150 CR	106'5"	77'1"	26'3"
	C-119	Transport	5	2 P&W R-4360	3250 hp	250 +	30,000	1100 CR①	109'4"	86'6"	26'8"
	XC-120	Transport	5	2 P&W R-4360	3250 hp	250 +	30,000	1500 R①	109'4"	83'	24'11"
Fletcher	FD-25	Attack, Liaison	1	Cont. E-225	250 hp	187**	16,500	630 R	30'	20'11"	6'3"
Grumman	SA-16A	Rescue	6	2 Wr. R-1820	1425 hp	250 +	26,000 +	1150 CR	80'	62'2"	24'4"
Lockheed	F-80	Fighter	1	All. J-33	5200 + lbs T	600*	45,000 +	500 + CR	38'10"	34'6"	11'4"
	F-94	AW Fighter	2	All. J-33	5200 lbs T + Afb	600*	45,000 +	500 CR	38'9"	40'1"	12'7"
	T-33	Trainer	2	All. J-33	5200 lbs + T	600*	45,000 +	500 CR	38'11"	37'8"	11'8"
	C-121	Transport	5	4 Wr R-3350	2500 hp	350**	25,000 +	1100 + CR	123'	95'4"	23'

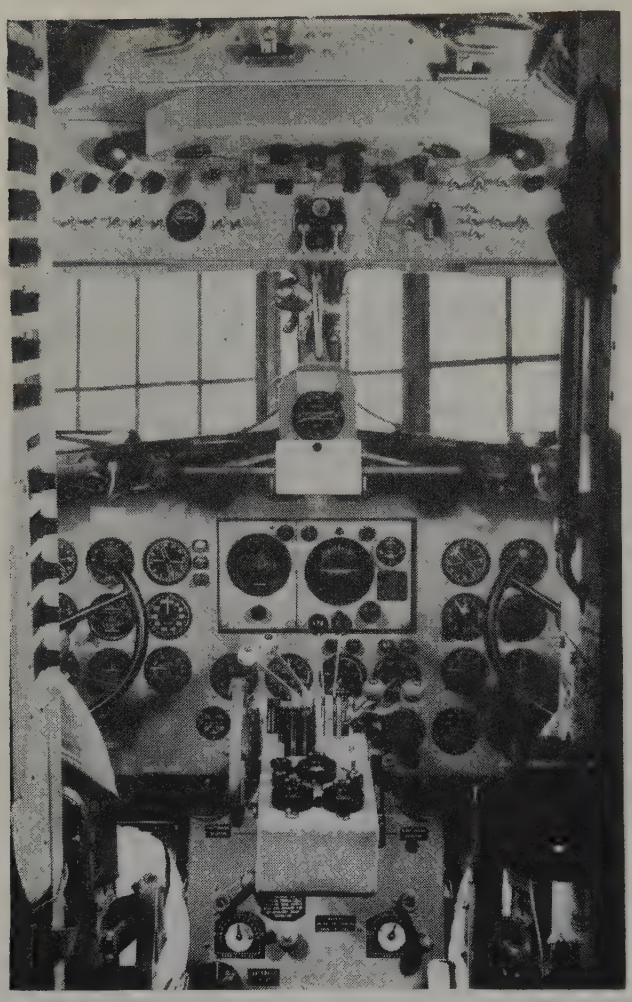
Martin	XB-51	Light Bomber	2	3 GE J-47	5200 lbs T	600 +			55′	80′	20′
	B-57	Intruder	3	2 Wr. J-65	7200 + lbs T	600 +			65′	65′6″	15′7″
	B-61	Pilotless Bomber	0	All. J-33							
McDonnell	XF-88	Fighter	1	2 West. J-34	4000 lbs T	650 +	45,000 +	1000 + R	39′8″	54′1″	17′3″
North American	RB-45C	Reconnaissance	4	4 GE J-47	5200 lbs T	550	45,000 +	800 CR	89′	75′3″	25′2″
	F-86D	AW Fighter	1	GE J-47	5200 lbs T + Afb	650*	45,000 +	500 CR	37′1″	41′8″	14′10″
	F-86E	Fighter	1	GE J-47	5200 lbs T	650*	45,000 +	500 + CR	37′1″	37′5″	14′7″
	T-28	Trainer	2	Wr. R-1300	800 hp	285**	25,000 +	700 + R	40′1″	32′	12′9″
Northrop	F-89D	AW Fighter	2	2 All. J-35	5000 lbs T + Afb	600*	45,000 +	500 CR	56′2″	53′4″	17′7″
	X-4	Research	1	2 West. J-30	1600 lbs T	650*			26′10″	23′4″	15′
Republic	RF-84F	Reconnaissance	1	Wr. J-65	7200 lbs T	650 +	45,000 +	850 + CR	33′7″	43′3″	14′4″
	F-84G	Fighter	1	All. J-35	5600 lbs T	600 +	45,000 +	850 + CR	36′4″	38′5″	12′6″
	XF-91	Interceptor	1	GE J-47 plus XLR-11-RM9 in tail	5200 lbs T	700 +	45,000 +	1000 + R	31′3″	43′3″	18′1″
Temco	YT-35	Trainer	2	FR. 6A4-165-B3	165 hp	155**	20,000 +	550 R	29′4″	21′9″	8′4″
Chase	C-122	Transport	2	2 Wr R-1820	1425 hp	220**	23,000	2000 R	86′4″	56′7″	21′3″
	C-123	Transport	2	2 P&W R-2800	2100 hp	230 +**	30,000 +	2500 R	110′	77′1″	32′8″
Bell	H-12	Helicopter	1	P&W R-1340	600 hp	105**	13,000	400 R	47′5″	58′8″	14′3″
	XH-15	Helicopter	1	Cont XD-470-5	285 hp	100 +	20,000	100 CR	37′4″	44′9″	11′
Doman	YH-31	Helicopter	1	.....	.....	.....	.....	240 CR	.....	.....	.....
Hiller	H-23	Helicopter	1	Fr 0-335-4	178 hp	84	13,000	210 R	35′	38′6″	9′5″
Hughes	XH-17	Cargo Lift	.....	2 GE J-35	4000 lbs T	.....	.....	.....	.....	.....	.....
McDonnell	XH-20	Jet 'Copter	1–2	.....	.....	.....	.....	.....	.....	.....	.....
Piasecki	XH-16	Utility 'Copter	3	2 P&W 2180	1650 hp	.....	.....	.....	82′	113′	31′1″
	H-21	Rescue 'Copter	2	Wr R-1820	1425 hp	140 +	20,000 +	300 CR	44′	54′5″	15′
Sikorsky	H-18	Helicopter	2	Fr 0-425-1	245 hp	100 +	20,000 +	100 + CR	33′	27′6″	9′10″
	H-19	Helicopter	2	P&W R-1340	600 hp	120 +	20,000 +	200 + CR	53′	41′	14′

*—Class
**—Maximum
***—Cruising
T—Thrust
R—Range
CR—Combat Radius
Afb—Afterburner
P&W—Pratt & Whitney
Wr—Wright
All—Allison
GE—General Electric
Cont—Continental
West—Westinghouse
Fr—Franklin
CW—Curtiss Wright
①—With 10,000 lb load

Engineered Radio

Successful and efficient radio panel is that set up through pilot and engineer cooperation

By Harvey A. Senior



EXECUTIVE DC-3 features ADF and Range receiver controls on overhead panel; VHF is mounted on the center pedestal

THE safety and reliability of aircraft operation is related directly to the caliber of the machines and the men who maintain and fly them. Owners of executive aircraft are nearly always business men who must weigh the utility of their business machines against the dollars and cents investment in such equipment. From their point of view, then, it is good economy to invest in airframes, engines, and accessories of proven design, in flight personnel and maintenance facilities of top-notch quality, and to be unstinting in the amount of instrumentation provided.

In brief, when the busy executive wishes to go from here to there, he wants to climb aboard, secure in the knowledge that he will reach his destination with the greatest assurance that human efforts can provide.

Executives, of necessity, must travel in everything but downright unflyable weather. Accordingly, their aircraft must be equipped to cope with changing weather conditions while aloft, and to facilitate flying under instrument conditions for extended periods. As a matter of fact, many executive aircraft come as close to "all-weather" flight as the present status of the art will permit.

It has become general practice for executive-aircraft owners, whether they purchase a used plane in good condition or a new plane from the factory, to "convert" the plane to their own needs and desires.

Shortly after the end of World War II, many of the surplus warcraft were purchased and converted to executive-transport needs. Accessory equipments and furnishings of such military craft were largely special purpose and, therefore, not suited for civil use. The airframes and powerplants were of the best, however, and the new owners liked the high cruising speeds even though passenger space was often limited. Considerable ingenuity was displayed in adapting war surplus equipments for their civilian role. Undoubtedly, many of these converted military craft were instrumental in forcefully demonstrating the advantages of the airplane to businessmen and thereby played a large part in stimulating the remarkable growth of corporate aircraft operation during the past five years.

Progress in things aeronautical proceeds at a dizzy pace, however, and many conversion projects of today revolve about the desire to install equipments that permit use of the latest navigational aids and techniques. For instance, the low-frequency four-course range of a few years ago required only a radio receiver and a pair of earphones to obtain voice communications and to fly the beam. Today, the VHF omni-range receiver with related accessories permits selection of a desired course toward or away from the station, track information is displayed visually, and localizer beam facilities may be utilized. Additional accessories permit ADF and

magnetic compass presentation on a single indicator (RMI) to provide the pilot with continuous automatic presentation of heading and course with reference to the omni station. It is evident that the latter equipment provides access to greatly increased utility and, in the light of present-day instrument flying, is practically mandatory.

Generally speaking, a complete conversion conceivably may consist of stripping the plane to its bare framework (or obtaining a new plane in the same condition) and starting from scratch. Equipments to be installed would then fall into categories as follows:

Furnishings—this will include cabin appointments such as chairs, tables, floor covering, soundproofing, lighting, and wall covering. Flight crew seating will fall under this heading.

Powerplants—to include the main engines, accessories, and related components.

Instruments—to include all engine, flight, and navigation instruments and associated items.

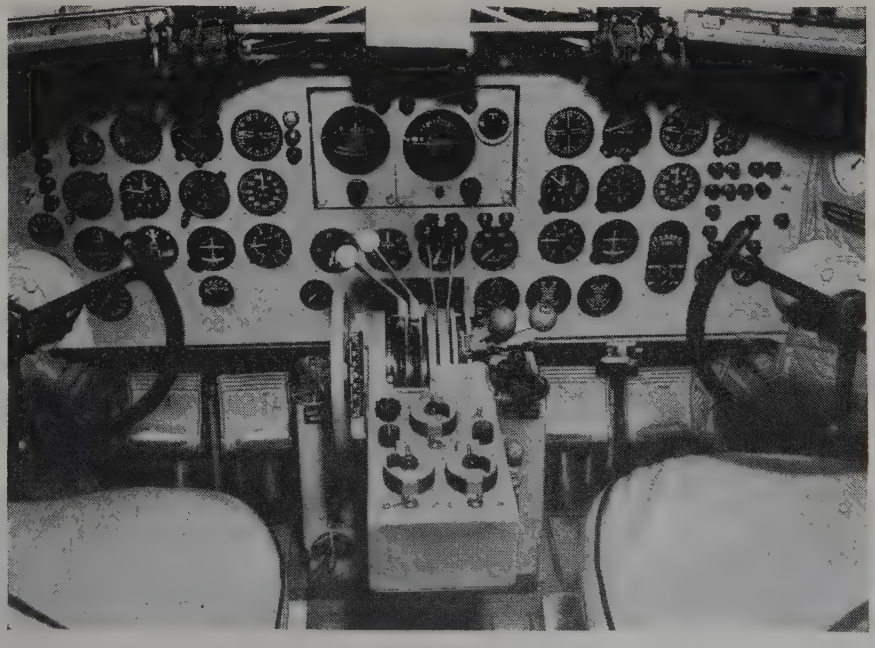
Electrical System—consisting of engine-driven generators (a-c and/or d-c), generator control units, protective devices, control switches, operating devices, and interconnecting wiring.

Radio System—comprising all communication and navigation radio components, control mechanisms, indicators, and interconnecting wiring.

Several operators in the conversion field have developed highly skilled organizations to handle complete conversions on a "one-stop" basis. That is, they handle all work by means of their own personnel and facilities. This type of operation is exemplified by Southwest Airmotive Company of Love Field, Dallas, Texas, and AiResearch Aviation Service Company of Los Angeles.

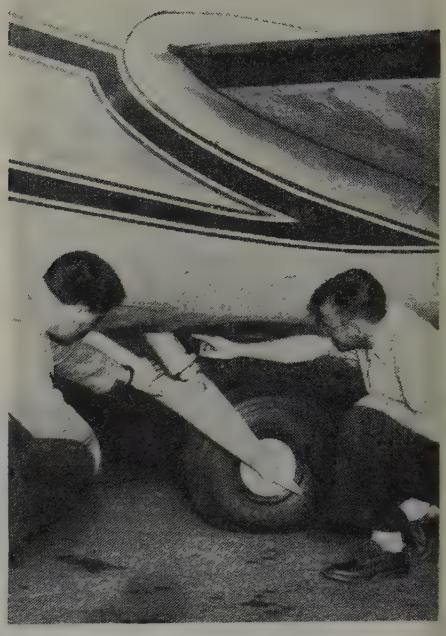
Other operators in the field, however, have finalized on one portion of the breakdown as listed in the foregoing and have aligned their organizations accordingly. One such operator who has forged an enviable reputation in creating "engineered radio systems" for executive aircraft is the Smith-Meeker Engineering Co. whose aviation branch is at Teterboro, New Jersey. This group is under general supervision of Fred- (*Continued on page 54*)

RADIO GEAR boxes for radio equipment considered adequate for today's needs fill entire radio compartment of this executive DC-3. The radio compartment is located immediately aft of the executive pilots' "front office." Plane is owned by Texaco



RADIO equipment for another oil company's executive DC-3 is mounted in similar manner. VHF communications and navigation radio controls are placed on control pedestal between pilot and copilot positions, readily accessible to both men

ESSO executive DC-3 features two large picture windows in the main passenger cabin, a new Kidde fire extinguisher system, and installation of a Sperry engine analyzer



COPILOT Cain of Standard Oil inspects retractable tail wheel with F. Bouslough

SKYWAYS for BUSINESS

News notes for pilots and owners of the 8,000-plus airplanes for business

Bristol-Myers Develops Maintenance Manual

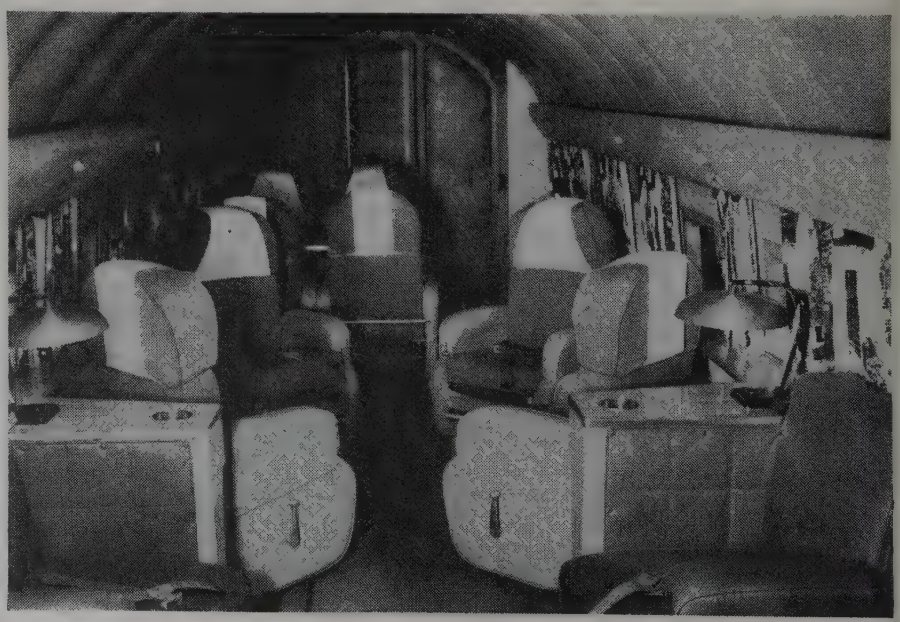
Bristol-Myers Co. recently acquired a newly converted executive DC-3. In line with the operation of that plane, Bristol-Myers' Aviation Department and its boss, Stan Bloyer, in particular, put together its own operation and maintenance manual. Divided into eight main sections, the B-M Manual includes: Domestic Operations; Domestic Operations Objective and Organization; Operation Flight Policy; Domestic Operations Aircraft Operation; Domestic Operations Emergency Procedure; Domestic Operations Qualifications; Foreign Operations; and Maintenance. Each of these eight main sections are subdivided into 20 or 30 parts.

In most cases the operators of executive aircraft follow the CAA Regulations of 100-hour inspection with their own individual additional checks. In adhering to its own Manual, Bristol-Myers has set up maintenance similar to the Douglas 1-2-3 inspection (40, 80 and 160 hours), the progressive air-carrier inspection system which means even more between-time checks. The CAA 100-hour type of inspection requires the annual inspection as well, but with the progressive type of maintenance as done by Bristol-Myers and several airlines, the annual is done away with. The Bristol-Myers major overhaul is done at 8,000 hours, but the wings are pulled at 4,000 to check center sections, etc.

There has been talk of the CAA preparing a Maintenance and Operations Manual, with minimums, specifically for corporation aircraft. This, because of the great amount of flying the executive craft are doing. Should the CAA actually put out such a manual for corporate-aircraft operators, many pilots feel CAA would do well to use the Bristol-Myers manual as a pattern. The company's DC-3 has been named "Bristoliner II," and is piloted by David L. Flannery, Jr. Copilot/Engineer is Bill Abbott, and Max Beitscher is Chief of Maintenance. The plane averages 80 hours a month flying business trips throughout the United States, Canada and Mexico.

Bristoliner II is based at Teterboro, N. J., and its conversion work was done by Mallard Industries.

BRISTOLINER 11 is Bristol-Myers newly converted C-47B. Plane averages 80 hours per month on business trips throughout United States, Canada, Mexico. Pilot is Dave Flannery



Esso Gets Newly Converted Executive DC-3 from EAS

Esso Standard Oil recently took delivery of its newly converted DC-3 from Executive Aircraft Service, Dallas, Texas. A few of the special features that help make this Esso DC-3 an outstanding corporate plane are: two extra large picture windows in the main passenger cabin; a retractable tail gear that affords safer single-engine performance and an increase in airspeed; a new Kidde fire extinguisher system; a Sperry electronic engine analyzer which gives a visual picture of the engines' performance while the plane is in flight; Jato for extra power on take-offs and in high-altitude operations; a new heating system, installed in the tail section, which circulates hot or cold air into the cabin while the plane is on the ground as well as in the air; sleeper bunks similar to those used on the DC-6; and a compact commissary for eight full-course meals or just snacks for the passengers and crew.

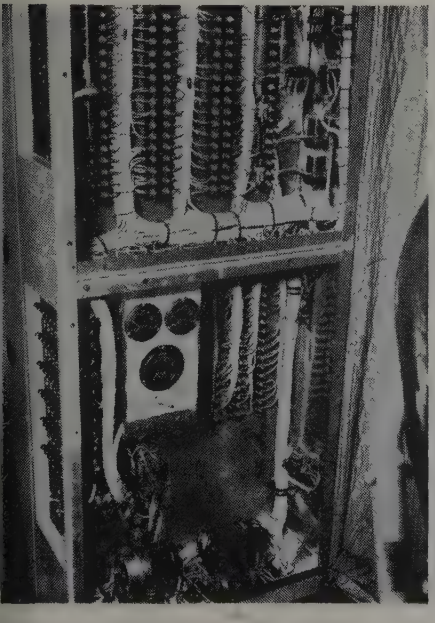
New Antenna Pitot Mast for Exec C-46

Because of the heavy demand from C-46 owners, the American Airmotive Corp., of Miami, Florida has announced the manufacture of a new and improved antenna Pitot mast, cast aluminum and CAA-approved. This new antenna mast eliminates end-splitting and offers strong resistance to rain and hail corrosion. It has also been proofed against the action of de-icer fluids. The old-style antenna mast was made of formica which was given to cracking, splitting and erosion, necessitating frequent replacement.

Alni-Clad for Propellers

A new process, called Alni-Clad, has been developed to protect seaplane props from effect of salt spray, Hamilton Standard has announced. New process coats aluminum with nickel to give hard yet resilient coating.

CENTRAL junction box for Pan-Am Southern's DC-3A is located behind the pilot's position



. . . in the Corporate Hangar

Bill Lear's Beechcraft D18S has been in the hangar at Roscoe Turner Aeronautical for a Magnaflux inspection and drag leg installation.

Hollingshead Corporation's Grumman *Mallard* is back in service following installation of an ARC Omni and additional communications facilities. Installation was done by Atlantic Aviation at Teterboro, New Jersey. Home base for the ship is Camden, New Jersey; Chief Pilot is Richard Gately.

Twin-Beech owned by Mountain States Drilling Company of Denver, Colorado is back in service after a double engine change and minor maintenance at Spartan Aero Repair, Tulsa Oklahoma. Chief pilot of the MSD plane is E. Ward Fitzwater.

Also at Spartan but now back flying is the S. W. Richardson Oil Company *Lodestar*. It was in for a tank-sealing job. Chief pilot is Ed Armstrong, and home base is Fort Worth, Texas.

Tom Davis flew Jacquelin Cochran's *Lodestar* in for work on the right engine, a light check, and gear-retraction test. Mechs at The Babb Company did the work.

Lockheed *Lodestar* belonging to National Steel Corp., Pittsburgh, Pennsylvania, has been in the AiResearch shop for gas-tank sealing, installation of new radio and a Lear autopilot, and other miscellaneous maintenance. The plane was flown to California and AiResearch by Rol Pedleton and Clyde Goettel, pilot and co-pilot of the National Steel *Lodestar*.

Bob Darnell, pilot of United Rexall Drug's Douglas B-23, brought the ship in for general maintenance, radio work, and reworking of the heating system by AiResearch.

Marshall McDowell and his copilot Dave Allen are back in Canton, Ohio, after a 100-hour check and installation of an automatic pilot in the Hoover Company's Twin Beech.

Tennessee Gas Transmission's DC-3 has been in the Executive Aircraft Service hangar. The DC-3 is getting a new interior and a double engine change. At the same time, Associated Radio is reracking and rewiring the radio gear to incorporate FM equipment, deluxe control panels, etc. Overseeing the job are Chief Pilot Tony Zuma and his copilot Sid Pourchot.

Lockheed Aircraft Service-International has three Lockheed Model 14's in its shop for fuel tank stripping and resealing. Planes belong to Field Aviation Co., Ltd., Ashawa, Ontario, Canada.

Bob Clark, pilot of the new Twin Beech owned by O. E. Hall Drilling Company, Wichita Falls, Texas, renewed acquaintances with old friends at Southwest Airmotive while he was waiting for his passengers for the air trip back to Wichita Falls.

Lockheed 12 is back in the air serving executives of the Warren Petroleum Company of Tulsa, Oklahoma, following an engine change and an exterior paint job by Spartan Aero Repair.

R. G. LeTourneau's A-26 has been in Associated Radio's shop for modification of radio equipment. One job was a change in the plane's transmitter frequency set-up in preparation for a trans-Atlantic hop. LeTourneau's C-46 got the same treatment earlier. R. E. Barnwell brought in the A-26.

Pilot Al Phillips and Copilot Bob Vincent brought Riverside, Inc's Lockheed *Lodestar* to AiResearch for gas-tank sealing. Home base for Riverside's *Lodestar* is Dallas, Texas. Also from Texas, this time San Antonio, came Guy Walter with the Ralph E. Fair, Inc., *Lodestar* for gas-tank sealing.

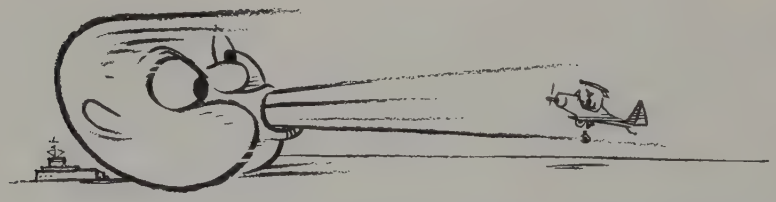
Standard-Vacuum's DC-3 crew, chief pilot Joe Hobcrost, flight engineer Mario Brontoli, took off for their Sumatra, Indonesian base after Associated Radio tailor-made the DC-3's radio equipment for a thiru crew member (radio operator) so that it could be serviced by local airlines in the tropics. Executive Aircraft Service converted the ship for a combination of cargo and personnel, and installed 1830-75's when they changed engines.

Bob Harlow, pilot of Transcontinental Gas Pipeline Corp., took delivery on the company's PV-1 following extensive maintenance by Spartan Aero Repair. The plane is based at Houston, Texas.

DILBERT

By S. H. Warner and R. Osborn

There She Blows—Down through the ages one of the most popular sports during a high wind has always been to watch the pretty girls go ballooning along, making like September morn. Then came aviation, and the Wright brothers changed all that



—or did they? Anyway, it is exciting to watch someone try to land a lightplane in a heavy wind, particularly Dilbert. With him at the controls your blood pressure is sure to get a workout.

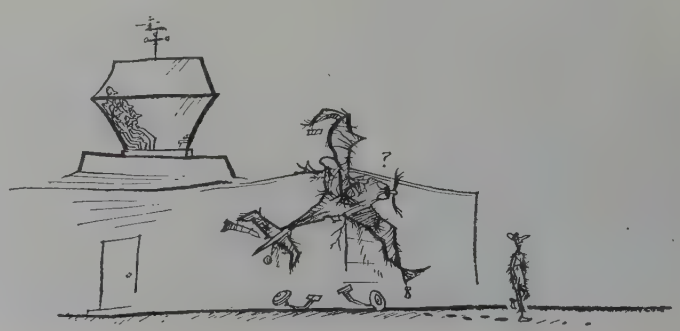
He tried to land the other day during a local squall. The wind was clocked as "shifting and gusty, varying from 20 to 45 mph, and from West through North." In addition to ignoring the tower warning to stay clear till the storm had passed, he landed with full flaps.

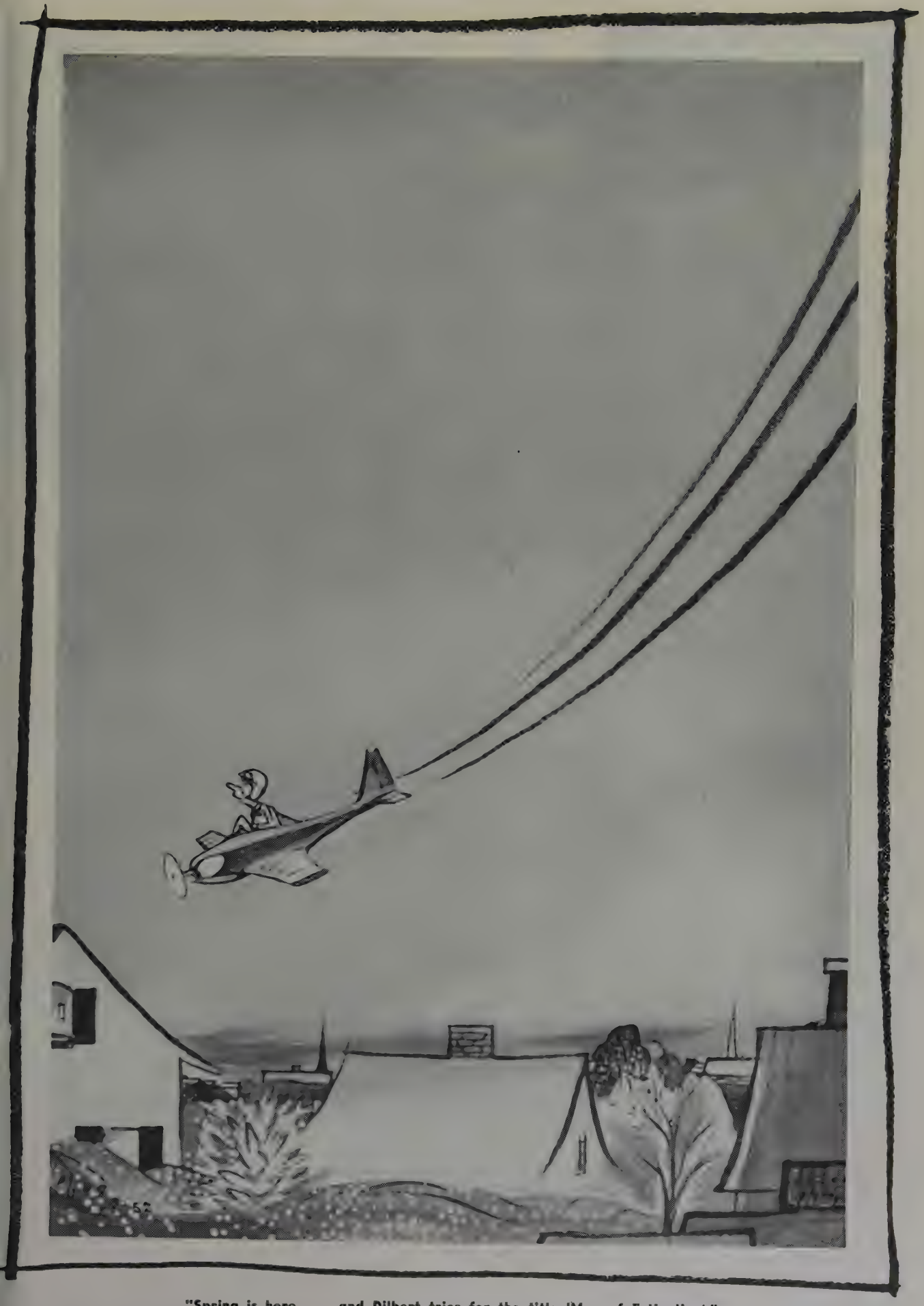
As he touched down, a gust lifted his right wing and threw him into a left turn, off the runway and toward the control tower. He applied a burst of throttle "in an attempt to straighten out," but it only increased the turn to the left.

Believe it or not, Dilbert then applied full throttle for take-off. He made it, too, and immediately went into a steep climb, attempting to avoid the tower. With full flaps and excessively nose-high altitude, however, he mushed into a corner of that stone building. Fortunately, Dilbert was wearing a shoulder harness on this flight and walked away from this complete wreck.

How dumb can a guy get? How many mistakes can you make on one flight? The tower wasn't the only stone wall Dilbert crashed into; the other one was right between his ears.

Cured—(. . . *Then I closed my eyes and visualized the pilot bailing out. He tumbled in grotesque slow motion until his white chute opened against the blue background of the sky. An instant only; then the pilot continued* (*Continued on page 60*)





"Spring is here . . . and Dilbert tries for the title 'Man of Extinction'."

CAOA REPORT . .

CORPORATION AIRCRAFT OWNERS ASSOCIATION, INC.

Corporation Aircraft Owners Association is a non-profit organization designed to promote the aviation interests of the members firms; to protect those interests from discriminating legislation by Federal, State or Municipul agencies, to enable corporation aircraft owners to be represented as a united front in all matters where organized action is necessary to bring about improvements in aircraft equipment and service, and to further the cause of safety and economy of operation. CAOA headquarters are located at 1029 Vermont Ave., N.W. Washington 5, D. C. Phone: Metropolitan 0714.

New Secretary

The Board of Directors of the Corporation Aircraft Owners Association has appointed Herbert O. Fisher as Executive Director and Secretary of the Association.

Mr. Fisher has resigned as Chief Test Pilot and sales representative of Curtiss-Wright Corporation and brings to CAOA years of experience as both a pilot and an executive. He began his flying career in 1928 in Indianapolis, Indiana and served as the Director of Aviation for the Indianapolis Chamber of Commerce from 1929 to 1938. During these years, Mr. Fisher also served as State Governor of the National Aeronautics Association, Technical Advisor of the Airport and Air Marking section of the Bureau of Air Commerce, President of Indianapolis Aero Club, and as a member of the Planning and Development Committee for Stout Field and Indianapolis Municipal Airport.

Herb Fisher joined the Curtiss-Wright Corporation in 1938 and spent 14 years in Engineering, Flight Test, Public Relations and Sales activities for that company. During his 9,000 flying hours without a mishap, he flight tested over 4,000 new military aircraft. Herb is particularly well known for his research in the early days of World War II as a civilian test pilot in the China-Burma-India Theater, to which he was called by the Air Transport Command of the Air Forces to conduct experimental flight tests and to assist pilots in establishing the operational techniques of flying the "Hump." As part of this test program, Herb flew 46 trips across the Himalayas in C-46's, plus flying with various P-40 Fighter Groups in China on many Jap combat missions to evaluate the performance of this type aircraft under actual fighting conditions. This and other flight experience has carried Mr. Fisher to practically every country in the world.

In 1945, Herb Fisher became associated with the experiments of the reversible propeller as a landing brake for increased safety. On November 26, 1947, he was the first person to reverse all four propellers simultaneously in flight on a multi-engine aircraft. He planned, developed and proved that high rates of descent (better than 10,000 fpm) could be obtained at low forward speed from high altitudes for emergency, tactical and procedure let-downs. From these flight tests that Herb ran, the Air Force recently indicated that this procedure may be incorporated on all high-altitude aircraft.

Recently, with the advent and trend toward very thin subsonic, transonic and supersonic propeller blades, Herb has been conducting vibration and high Mach Number dive tests on these types of blades at speeds between 550 and 600 mph.

For his contributions to military aviation, Herb was the first living civilian pilot to be awarded the USAF Air Medal by the President of the United States; the Veterans of Foreign Wars Medal; and the coveted Air Force Association's Medal of Merit. Recently, Herb was presented the first Captain Video Air Safety Award for improving the safety of air travel and as a symbol of all test pilots who have distinguished themselves.

Making his home in Caldwell, New Jersey with his wife and four-year-old son, Herb has been very active in organization and civic affairs: he has been Councilman for the Borough of Caldwell, Police Commissioner, Chairman of Finance and Welfare, Commissioner of Recreation, Member of the Board of Directors of the Kiwanis, Member of the Caldwell Chamber of Commerce and of Governor Driscoll's New Jersey Civil Air Defense Advisory Council.

New Members

At a recent meeting of the Association, the following companies were elected to membership:

The Hubinger Co., of Keokuk, Iowa. This company operates a Beech *Bonanza* and a new Aero *Commander*.

Michigan-Wisconsin Pipeline Co., of Detroit. The company owns and operates a DC-3, a Twin Beech, a Cessna 140 and a Piper PA-18. Chief Pilot is Lloyd Bauer.

Peabody Coal Co., of Chicago, Illinois, operates two Beech 18's. Chief Pilot is Lawrence W. Harris.

Kroehler Mfg. Co., of Napierville, Illinois. This company owns and operates two Twin Beech, and the chief pilot is Robert L. Hansen.

R. H. Fulton & Co., of Lubbock, Texas, have a Twin Beech for corporate flying, and R. J. Urquhart is the pilot.

Bristol-Myers Co., of Hillsdale, N. J. is a member again. Bristol-Myers was one of the founders of CAOA, but gave up its membership when the company Twin Beech was sold a year or so ago. Bristol-Myers now, however, owns and operates a DC-3. Its chief pilot is David L. Flannery.

Kimberly Clark Corp., of Neenah, Wisconsin. Paper manufacturers, the company fl a Twin Beech and a DC-3 for business. Ch pilot is A. T. Groves.

El Paso Natural Gas Co., of El Paso, Tex operates a *Lodestar*, a Twin Beech, and t *Bonanzas*. Pilot is A. M. Johnson.

In addition to these companies elected regular membership in the Association, other companies were elected to Associ Membership. They are:

Pratt & Whitney Aircraft, Hartford, Co The company operates a DC-3, a *Lodes* and a Sikorsky S-51 helicopter. Ralph Bourdon is Chief Pilot.

Collins Radio Co., Cedar Rapids, Io owns and operates three Twin Beech. R Wollan is the pilot.

HERBERT O. FISHER, veteran pilot, has be named Executive Director and Secret

Forum Postponed

The CAOA Board of Directors has nounced postponement of its plans for Fifth Annual Forum which was to have b held in Chicago in June. Cause of the p ponement was the sudden passing of Silsbee.

Herb Fisher, the Association's new Exe tive Director, is planning to take up programming of the Forum in the near ture, and the establishment of a new d for the meeting, probably late Septem will be announced soon.

CAA Cooperation

Recently, officials of CAA felt that operation of the control tower at Bridgep Connecticut, should be closed down beca indications were that traffic did not jus continuation of this facility. Mr. Cole M row, Chairman of the Board, presented CAA on behalf of CAOA and the 15 or corporate aircraft based at Bridgeport, tinent facts and figures, for further study CAA, that warranted continuation of operation of the Bridgeport tower. Thro the cooperative attitude of CAA and findings of all concerned, CAOA is happy to announce to its members that Bridgeport tower is in operation—thanks our good friends in Washington and Regio

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AT HUNDREDS OF AIRPORTS

SOCONY-VACUUM OIL CO., INC., and Affiliates: MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP.

Stolen Solo

(*Continued from page 15*)

east of the airport, and was on the airport when the plane landed in an adjacent farm field.

A train crew at Inver Grove, a community adjacent to South St. Paul, alerted the police when the low-flying craft barely cleared the locomotive on making its approach to the field.

The police know the landing was made, although at the time they thought the craft was an itinerant plane in distress. After the plane landed, and the boys disappeared into the night, it was discovered that the Beech *Bonanza* was one of those based by private owners on Fleming Field. The boys were arrested an hour later after boarding a St. Paul-bound streetcar.

Ben Wiplinger, operator of the flying service at the South St. Paul airport and from whose hangar the Beech was taken, confesses with his mechanics that the only way the plane could have gotten into the field adjacent to the airport was "to have been flown in."

Mr. Wiplinger also made plain several details about which the boys were questioned after their arrest. Their story insisted that they did not have to break in to gain access to the hangars, and that the ignition keys to both airplanes they wheeled from the hangars were in place, ready to turn on.

Mr. Wiplinger admitted that in all of his years in the fixed base aviation business, he had never given a minute's thought to an airplane being stolen at night.

"That accounts for the keys in the airplanes, and as for the hangar doors, they are often left open because someone is putting away his airplane late, or someone wants to get out early in the morning," the operator said.

Because of the interest which the story of the flight created across the country, and in view of giving aviation observers a clear picture of exactly what happened, I have prepared the following record on the basis of interviews with the two boys, each 16 years old, and whose first names only will be used.

Allan and Bob appear to be just two average youngsters, now juniors in high school. They had no history of trouble with police, and had never been in court until they faced the recent charges in connection with theft of the airplane.

Both boys told how they had become interested in the Civil Air Patrol even before they were 15 years old. Allan lived in South St. Paul at that time, and had become a member of the CAP unit as soon as he was eligible, while Bob took the CAP ground training with a St. Paul unit.

It was in this way that the boys picked up their basic knowledge and information concerning theory of flight and aerodynamics and a smattering of basic meteorology in weekly CAP classes.

Allan is an extremely pleasant kid, and a pretty sharp boy, too, if he finds reason to apply himself. Ambitious and persevering in his aviation hobby, he was able to get more than the usual attention from a Civil Air Patrol officer and instructor.

"I think I can say that I had about 10 to 15 hours familiarization and observation in a military version of a Piper *Cub* which belonged to the CAP unit," Allan told me.

"During that time in the air when I was supposed to be just an observer, I guess I had about two hours—maybe two to three hours—when I actually received some instruction at the controls."

Neither of the boys ever had an opportunity to fly an airplane "solo", and neither had ever taken any flight instruction intended to qualify him as a pilot.

Allan told me that he knows the Civil Air Patrol does not train pilots, and felt that he made as much progress as he did in actual flight familiarization because "the CAP officer seemed to take a liking to me."

Bob, the second boy, recalled that he had only had a half-hour period at the controls of a CAP plane under the direction of an officer carrying on the familiarization program for boys in the CAP.

Shortly after these boys were arrested for their 'unauthorized' flight, I asked Allan:

"Why would you take such a risk when you had all the odds against you?"

He looked me directly in the eye, and answered quickly:

"I don't expect anybody is going to understand this, *but I just had to fly that airplane.* I planned this for a year, and now that it is over, I feel better. I had to prove something to myself and to other people, too."

He knew he was in trouble, and said he didn't want to get anyone else in trouble. Pressed for further explanation, he refused to identify a pilot who more than a year before had given him a ride in an airplane, with a chance to jump by parachute.

"I had some friends waiting on the ground to see me jump," the intense, dark-haired boy recalled earnestly, and it was easy to sense the emotional conflict still going on within himself as he brought back the memory.

"To make a long story short, I didn't jump —I just went chicken, and my friends didn't let me forget it.

"Ever since that time I have thought and planned how I could take an airplane, fly it, and prove to myself and to my friends that I'm not really a coward. Well, it's all over now—but I don't expect anybody can really understand it."

Allan knew there were risks, "and if I hadn't have needed some help, I wouldn't have got Bob mixed up in this."

Bob, taller and slower than Allan, is a red-headed youngster, who admitted sheepishly, "I don't know why I agreed to go in on this—we were kind of buddies, and I guess I was sold on Allan's confidence that he could actually get away with it."

Fleming Field, South St. Paul's municipal airport, seemed to be the ideal place to carry out their extra-legal and unorthodox flight plan. Allan had played around the field when he was younger, and had flown a few times with the CAP pilot from the airport.

Fleming Field, with a bituminous landing circle, is not equipped with lights for night operation, and hangars and shops on the airport are always closed by late evening, the boys discovered.

As a result, they made several late-evening "visits" to hangars on the field, figuring out that a parked *Bonanza* could easily be wheeled silently out of the hangar to take off position at the landing circle.

Intending to ultimately fly the first *Bonanza* spotted in their first night visit, the lads took time to draw a detailed chart of the instrument panel, and also carried away the instruction manual provided by the Beech manufacturers for purchasers of their airplanes.

For two weeks the boys concentrated in their spare time on their secret plans, spending hours with the *Bonanza* instrument chart, until each felt he had memorized the function of each button and control. In addition they made up two check lists to use after they were airborne.

Then, on Friday, Dec. 7, the boys told their families they were taking a weekend camping trip into southern Minnesota, and would be away until Sunday. They packed camping clothes, with food and other supplies, and left home after school Friday.

They went to a late show in St. Paul, going by street car at midnight to South St. Paul. At the end of the line, they got out and made their way on foot to the airport about a mile away.

After making a preliminary circuit of the shops and hangars to make sure no one was working late, the youngsters felt they were "in the clear." Then they stopped to make an informal weather observation.

"We guessed the ceiling to be about 2500 feet," Allan remembered. "It was cloudy and, as a result, pretty dark. There was just a little wind, west northwest. Actually, as we discovered in the air, the ceiling was only about 1500 feet."

"Do you remember whether you were getting scared about this time?" I asked the boys.

After looking at each other for a moment, the boys shook their heads negatively, and Allan answered rather soberly:

"No, I don't think we were scared. You see, we had made up our minds so long before as to just what we had planned to do."

The boys did admit, however, that it was right at this point that their well-laid plans almost fouled up.

They had wheeled out a Beech which belonged to Mr. Lysdale, airport manager, and expected to sit in the plane for some time, because in their flight plan they had set time of take-off at about 5 a.m., in order to

(*Continued on page 46*)

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Stolen Solo

(*Continued from page 44*)

make a landing "somewhere in central Minnesota" after daylight.

Suddenly, the lights of a car shone in the darkness of the airport, and Allan and Bob scrambled from the plane, and ran to the edge of the airport where they crouched in the darkness.

"That car came down to the landing circle, and two men got out and came over and really gave that airplane an inspection," Allan recalled. "We were too far away to know what they were saying, but after a long time, they got back in the car and drove away."

The boys learned later that it was a South St. Paul police squad which had been checking the airport nightly because plane owners had reported they thought someone had been in their craft in the hangars.

"We still were not scared, but I guess we felt that we had to take off immediately, or not at all, even though it was only about 4 a.m. which meant landing somewhere while it was still dark."

Back in the cabin with flight plan, instrument charts and check lists, the boys tried to get the airplane started, but the engine refused to cooperate.

This necessitated a quick trip back to a second hangar, and this time they wheeled out a new Beech *Bonanza*, the property of George W. Heffelfinger, a Minneapolis grain company executive.

We noticed right away that this plane was a newer model, and the instrument panel was not identical with the one we had charted and memorized," the boys said, but they agreed that the differences were not radical enough to call off the flight.

It was decided that Allan was to do the actual piloting, and Bob was to check instruments and help in navigation.

The second Beech started immediately.

"Then we checked instruments in a hurry because we thought someone might come down to the landing circle after we started the engine. Then we took off into the wind."

(In order to give a clear and concise picture of what the boys actually did in flight, and their maneuvers in returning safely to the ground, the remainder of the interview is based on my questions (Q) and the answers, as given largely by Allan (A):

Q. Did you retract the wheels, and how long after take-off?

A. "Oh, we retracted the wheels almost immediately—they cut the rate of climb and we wanted to get altitude."

Q. How did you know the gear was retracted?

A. "Well, there is a little light and indicator, and it checked on."

Q. Did you use the trim-tab controls to climb?

A. "The trim-tab control was set at position 3. We knew the trim tab had to be used but we didn't know to what extent. We knew it would hold the plane on the ground longer—so you know you're in the air for sure when you actually take off."

Q. Did you actually think you could fly the airplane in the dark and knowing the weather might get bad?

A. "We knew we had all the instruments needed for flying blind, and we watched the artificial horizon on the panel and the compass, after getting into the air."

Q. What was your procedure after take-off?

A. "We took off almost due west, then banked north for the first leg of our flight plan. This took us directly over the city of St. Paul. We continued to climb, expecting to follow out our flight plan flying at 6,000 or 7,000 feet. We entered the overcast at about 1500 feet, and when the altimeter showed we had climbed to 6500 feet, we still had not broken out of the clouds.

"Bob was airsick almost immediately after take-off, but after we were in the air we made a complete check of instruments and controls according to the lists we had made.

"After about 10 minutes, Bob said the cylinder-head temperature was too high—and we wondered why the motor should overheat.

"We opened the cowl flaps, and reduced mixture control, and then in checking instruments and controls again, thought about the propeller pitch for the first time.

"We changed the propeller pitch from starting position to cruise, and after that the temperature seemed to be okay."

Q. Did you get scared when you found you could not get above the overcast, and remembered you were flying blind at 6500 feet?

A. "Well, I think Bob was pretty scared then, but I don't think I had time to get scared. But I did get more cautious. I know that. Actually, I don't think we had ever thought about the danger to people on the ground in case we crashed—I didn't think about it until we were in the air. I guess I didn't have time to think about being scared—we were up in the airplane then, and it had to be brought down again."

Q. Did you have any trouble keeping the plane flying in a straight line?

A. "While we were busy making the engine check, we noticed we had changed course a few degrees, but we corrected that by the compass."

Q. Why did you change your mind about carrying out your flight plan which would have taken you to central Minnesota?

A. "After we had been flying about 20 minutes, and were in the overcast, we still knew exactly—or just about exactly—our position north of St. Paul. We were now having trouble with ice forming on the windshield, and we knew that if it formed there, we would soon have icing trouble on the wings.

"It was right then that we decided the best thing we could do was to turn around and head back to South St. Paul and try to land there."

Q. In making your descent, what did you do?

A. "We cut the throttle, and turned the carburetor heat on."

Q. Did you put the wheels down?

A. "No."

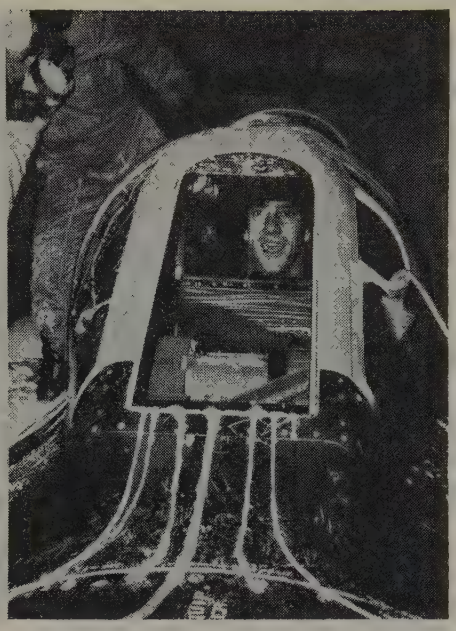
Q. Did you lower the flaps?

A. "No."

Q. Did you fly straight ahead in your descent, or in a spiral?

A. "When we decided to turn back we did put the plane into a turn, and it kind of skidded—I think it was already a little sluggish from the ice. When we had gotten around to a south heading by compass, we

(*Continued on page 48*)



QUICK WARM-UP—This official USAF photo shows rapidity with which the F-89 can be de-iced under extreme weather conditions. In the picture at left, the windshield is completely iced over. Shortly thereafter, with the windshield de-icing system put into operation, it is "clear vision forward" for the pilot of the twin-jet Northrop F-89. This demonstration was made during cold-weather tests on the Northrop *Scorpion* conducted at Eglin Air Force Base, Florida

MILITARY AVIATION

F-86F Sabre

First models of the F-86F, faster and improved version of the *Sabre*, were delivered to the Air Force recently. The new sweptwing '86 is powered by the General Electric J-47-GE-27 engines which has a thrust rating in excess of 5800 pounds, compared to the more than 5200 pounds of the earlier models. The new powerplant provides increased performance and maneuverability. The F-86F has a speed of "more than 650 mph at sea level," a combat radius of more than 600 miles and a top service ceiling of 45,000 feet. It is armed with six .50's.

Record Flights

What is believed to be an unofficial record for sustained flight was set by a Republic F-84G recently when it flew for 12 hours 5 minutes. The *Thunderjet*, flown by Lt. Walter Hodges, was aerial refueled four times by a Boeing KB-29 tanker plane. In another theater of operations, Europe, two *Thunderjets* flew 2800 miles over Europe in 4 hours 48 minutes in what might well be the longest sustained flight ever made by a jet fighter without refueling.

White Tops

Transport aircraft of the Military Air Transport Service soon will have a coat of white solar-resistant lacquer on cabin roof exteriors. Approval from Air Materiel Command (AMC) called for coating transports assigned to or operated through tropical areas. However, as nearly all MATS transport planes are routed through these areas, the approval will affect most of them. The entire "white-top" operation will be completed on a gradual basis, each plane being painted as it leaves the factory contracted to cycle-condition the aircraft. At the present time, only air evacuation planes have been lacquer-coated, primarily for patient comfort, but all MATS transports soon will be. Although the amount of heat resistance varies, the average temperature reduction is 8°.

Grumman XF-10F

Grumman Aircraft's new big fighter, the XF-10F *Jaguar*, is undergoing flight tests at Edwards AFB. With a variable sweptwing, the XF-10F is powered by a Westinghouse J-40 engine in the 9,000-pounds thrust class.

USAF's YF-101

McDonnell's production prototype fighter YF-101 is approximately 80 feet long, 25 feet 11 inches longer than the McDonnell XF-88. Added fuselage length of the 101 is necessary to accommodate extra fuel tanks and electronic gear to enable the XF-101 to meet USAF escort requirements.

Here an' There

CONVAIR's B-36 intercontinental bomber has a new heating system. It can produce four million btu's per hour . . . this would heat 53 six-room houses comfortably.

ELECTRONIC equipment going into some of the new jet bombers costs more than the entire cost of two World War II heavy bombers.

NORTH AMERICAN F-86D is scheduled for rocket armament in place of the .50's. The Lockheed F-94C and Republic F-84F also will be getting rockets in lieu of machine guns.

PIASECKI H-21, rescue helicopter for the Air Force, made its first flight recently. The H-21 is powered by Wright R-1820 engine of 1,150 hp, and grosses more than 13,000 pounds.

DELAWARE AFB at Dover, Del., is now under the jurisdiction of the Military Air Transport Service. The base becomes a part of MATS Atlantic Division, headquarters of which is at Westover AFB, Mass. It is planned that Atlantic Division headquarters will be moved eventually to McGuire AFB, N.J. MATS commander is Maj. Gen. Joseph Smith.

SKYSHARK—This is first flight photo of the Navy's new turboprop bomber, the Douglas A2D *Skyshark*. Two turbines housed in fuselage drive six-bladed contra-rotating prop in nose

Stolen Solo

(Continued from page 46)

were coming down pretty fast but holding a straight course to the south."

Q. How fast was the plane traveling as you descended?

A. "Well, we were kind of diving, and dropping pretty steep—the speed was just about 180 mph."

Q. What was your altitude when you broke out of the clouds and how could you tell in the darkness that you were out of the overcast?

A. "It was just about 1500 feet, and we could see the St. Paul city lights right away to our south. We tried to level out then because we knew we would be over the city, and we headed for the Mounds Park beacon which we saw right away. We knew we could follow the lights of Concord street along the river to South St. Paul, which we did."

Q. How did you slow the plane down for landing?

A. "We cut the throttle, of course, and started as slow as possible. But there were several pot-type flares burning on the airport, and we didn't know what they were for, so we flew low directly over the field on the first pass, and then went around again."

Q. Did you realize how low you actually were on your last approach over Inver Grove, the suburban community bordering South St. Paul and the airport?

A. "I was flying contact, and suddenly I realized how low we were when I saw a train locomotive directly ahead. I pulled up and continued to climb until we were just above the bluff southeast of the airport."

Q. What was your speed on this approach?

A. "Just about 100 mph."

Q. How did you slow the plane down then?

A. "Well, the throttle was closed, flaps were down and wheels were down, and I had turned on the landing lights before. Coming in just over the bluff, I held the plane steady because I had decided not to land on the airport itself. I didn't know what the flares meant, and I knew there was also a wire fence and a snow fence and I was worried about hitting them. So I made up my mind to just put it down in the field south of the airport.

"I set the plane down at about 50 mph. It has a tricycle landing gear, so I tried to hold the nose back and hit on the two wing wheels, then I gave it full throttle to keep the nose from going over.

"As soon as we stopped, Bob got out and started getting our things out of the plane. I tried to turn the engine off but it wouldn't stop, and I wouldn't get out and leave until it was actually cut off. Then we both ran in the dark before anyone on the airport could get out to where we landed in the field."

From the standpoint of a reporter, I think the fitting sequel to this story is the fact that Allan recently went down to the Air Force recruiting office to see if he could enlist when he turns 17. Under present regulations, he cannot be accepted for enlistment until six months after his year's probation period has ended.

"That puts my plans back a whole 18 months," he said with chagrin.

But don't worry about Allan—he will probably 'land' successfully!

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BEECHCRAFT D-18-S TWINS—12 FOR SALE—$40,000 UP. 1946, #8017-RS, has constant speed props, best equipment, deicing, and 3 zero engines. $47,500. Also: 1946 Executive, #63PS, with hydromatics, best equipment, deicing, and 2 zero engines. $67,500. Consult **POWERS & GEORGE.** "Airplanes Everywhere."

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LOCKHEED 12A'S—3 FOR SALE—$25,000 UP. Executive, #400SS, has 193 hours since aircraft, engines, and hydromatics major overhauled. Auxiliary tank. De-icing. Reupholstered. Excellent radio. Original owner. Beautiful bright clean condition. $30,250. Consult **POWERS & GEORGE.** "Airplanes Everywhere."

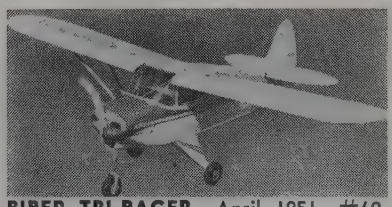
BEECHCRAFT BONANZAS—22 FOR SALE—$6750 UP. Late 1948, A-35, #65ZBS, has 325 total hours. New Beech propeller, gyros, two-way LF and VHF with Omni-range and loop. Relicensed October. Never damaged. All bulletins. Excellent. $11,500. For details consult **POWERS & GEORGE.** "Airplanes Everywhere."

BELLANCA CRUISMASTERS—3 FOR SALE—1950, #659GNS, has only 200 hours. Controllable metal propeller, primary blind instruments, and two-way LF and VHF radio with Omni-range. Relicensed October. Never damaged. Like new. Bargain. $9570. For details consult **POWERS & GEORGE.** "Airplanes Everywhere."

CESSNA 170'S—19 FOR SALE—1948, #408SVS, has only 225 total hours. Metal propeller, Gyro compass. Radio. $3700. Also; 1950 painted metal, #979-SAS, with 246 hours. Metal propeller. Gyros. Narco Omni-range. Extras. New condition. Bargain. $6,000. Consult **POWERS & GEORGE.** "Airplanes Everywhere."

SWIFT 125'S—14 FOR SALE—$2000 UP. 1951, #245QVS, has only 157 total hours. Aeromatic. Primary blind instruments. Radio. Manifold pressure. Cylinder head temperature. Seat covers. Undamaged. Hangared. One owner. New condition. Bargain. $3400. Consult **POWERS & GEORGE.** "Airplanes Everywhere."

REPUBLIC SEABEES—15 FOR SALE—$1800 UP. Corporation owned, #644PKS, has 300 hours. Reinforced hull painted beautiful orange. Reupholstered 1951. New prop. Primary blind instruments. Radio. Loop. Never in salt water or damaged. No corrosion. Exceptional. $2950. Consult **POWERS & GEORGE.** "Airplanes Everywhere."



PIPER TRI-PACER—April 1951, #69-JAS, has only been flown 38 hours. Painted grey with red stripe. Metal propeller. Sensitive altimeter. Two-way radio. Door locks. Other extras. Beautiful new condition throughout. Asking $5050. For complete details and inspection arrangements consult **POWERS & GEORGE.** "Airplanes Everywhere."

BELLANCA CRUISAIRS—10 FOR SALE—1947, #7431PS, has 810 total hours. 150 hours since aircraft and engine overhauled. Aeromatic 70 hours since O.H. Mufflers. New tires. Primary blind instruments and gyro. Radio. Loop. Excellent. Bargain. $3350. Consult **POWERS & GEORGE.** "Airplanes Everywhere."

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SEE YOUR TRAVEL AGENT

SAC's Seeing-Eye Jets

(*Continued from page 12*)

Another aid is the optical view finder, designed especially for the RB-45C by the Chicago Aerial Survey Company. From 30,000 feet, the photo-navigator can see approximately 272 square miles of earth in his 10-inch scope.

Crew members of the "seeing-eye" jets probably have the broadest view of the world today, geographically speaking. With a sweep of the eye they look down on a full day's automobile journey and think nothing of it. By visiting 18 predetermined points over the United States, they could bring back photographs covering the entire 48 states.

For example, an RB-45C crew over Zanesville, Ohio, can enjoy the scenery all the way from Hagerstown, Maryland to Indianapolis, Indiana—parts of 10 states, 30,000 square miles. And over Taft, California, they can see San Diego and San Francisco at the same time, with Las Vegas looming on the horizon.

The RB-45C's cost the Air Force about $1,500,000 for the plane, $1,000,000 for radar equipment and $200,000 for cameras. North American engineers had to completely redesign the interior of the *Tornado* to make a suitable photographic and reconnaissance plane out of it.

Although the Air Force furnished all cameras, it was necessary to develop special mounts and redesign the B-45 from the bomb bay aft. Design work required six months and 1,791 drawings.

The most unique camera mount inside the RB-45C is that of the multiple split vertical station. Attached to a moving truck that rides on small tracks, four cameras can be used in pairs through a single window. This way twice as much film can be exposed.

Accurate photography is assured by a constant 70° temperature at all camera stations, even while low-altitude skin friction raises the fuselage interior to a steamy 180° and high-altitude makes a sub-zero deep-freeze out of it. An aircycle-type refrigeration system has been developed which cools the 400° air from the engine compressor to any desired temperature. This system is the equivalent of 100 home electric iceboxes and could make 550,000 ice cubes a day.

When the "seeing eye" jets come home from a mission, that's when the Reconnaissance Technical Squadron—"Decce-Tech" to the 91st Wing—takes over. Its primary job is to process raw radar and visual negatives into charts, mosaics and overlays for use at command headquarters. In three hours a flash report on the mission is available; in eight hours a complete report.

"Recce-Tech" consists of a photo laboratory, photo interpretation, indexing and plotting, photo mapping and reproduction. The latter includes complete scale-model representation of the target area as well as an air-transportable Harris offset press for map printing.

Because aerial photography and reconnaissance information are extremely vital to the conduct of modern warfare, operations are timed to the split second. Each man has a job to do and he must perform it unerringly. For example, if it takes more than three and a half minutes to unload film magazines from the plane cameras, someone gets chewed—but good.

Special photographic equipment has been developed to speed the processing of film. Automatically operated tanks develop the negatives—some of them longer than a football field—and giant dryers grind out prints like sheet metal coming from a rolling mill.

Highly trained technicians fit fractional prints into mosaic maps; photo-interpreters with slide rules and stereoscopes study the films and make estimates of terrain, enemy concentrations, industrial potential, bombing results, etc. Critiques are presented to the crews so that they may avoid future mistakes.

The net output of the "seeing-eye" jets and "Recce-Tech" finally lands on the desk of SAC's commanding general at Omaha.

Not long ago a newspaper reporter was writing a story on the RB-45C's and "Recce-Tech." Major Don K. McCash, commanding officer of the outfit, jerked a thumb over his shoulder at a photograph on the wall.

"What do you think of it?"

It was a photo of an Air Force sergeant looking at a bridge-game hand—taken at a distance of 50 feet altitude by an RB-45C flying at 500 mph. You could easily distinguish the clubs and diamonds, but the hearts and spades looked pretty much alike. The reporter was impressed and said so.

The major shook his head.

"Terrible," he said. "Not enough detail."

That's the spirit of the officers and men of the 91st Strategic Reconnaissance Wing who fly the "seeing eye" jets and who constantly strive for photo perfection.

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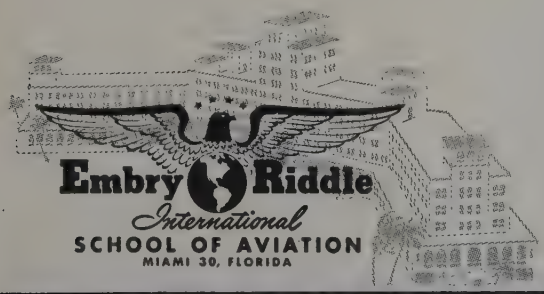

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TRAIN IN MIAMI -- AIR CAPITAL OF THE WORLD

Engineered Radio

(*Continued from page 37*)

erick B. Woodworth whose experience in the aircraft radio game goes back to the very first commercial equipment for such use while with the Bell Telephone Laboratories about 1928. Actual operations are handled by Clarence Myers and Fred Baxter in their shop at the Mallard hangar at Teterboro, New Jersey. Clarence keeps an eye on the multitudinous supervisory details, and Fred transforms the desires of the customer into working drawings that are implemented by a corps of skilled technicians into the final installation.

Every conversion project is unique in that the final result represents the exact desires of the customer. It will be the aim of this article to follow through a typical project with a view toward presenting the steps involved. In this way, corporate-aircraft owners, flight personnel, and interested parties may become aware of the manner in which such work is handled.

Planning Analysis

The men at Smith-Meeker like to think of their work as "engineered radio systems" and they will tell you that adequate planning plays a very large part in obtaining an installation that is satisfactory from the standpoint of use and reliability.

First step normally consists of a survey of the existing equipment and its location in the airplane. A conference is then arranged between the airplane flight personnel and the radio engineers. The pilot usually has definite ideas as to equipments needed and he is armed with a list of such items. After all, he is the fellow who will be using the gadgets, he knows the inadequacies of the present equipment and he knows the type of flight operations under which the new equipment will be expected to operate. On the other hand, the radio engineers bring a highly distilled knowledge of many previous projects and the subsequent operations thereof. Such knowledge often contributes helpful suggestions in avoiding obscure pitfalls.

It is relatively easy to make changes at this stage. As a result, heads cluster closely about the conference table and much doodling of tentative arrangements results. After a longer or a shorter time and possibly several sessions, depending upon the scope of the project, a final list evolves containing present items to be retained and new items to be added.

The radio engineer now heads for his drafting board and sets about the task of transforming the results of the conference into working drawings. Airplanes are known to require many compromises in order to achieve a balance between aerodynamic and structural requirements. By the same token, the radio engineer often makes use of accumulated job knowledge in placement of the many items within the airplane structure while maintaining weight and balance factors within prescribed limits. Executive airplanes are usually multi-engine craft having a considerable payload, but a rundown of radio equipments considered adequate for today's needs would seem to require the proverbial shoehorn to fit everything within the space available.

There are a few general factors that may be mentioned at this time. Whereas the plane of a few years ago had the several radio controls at various locations round about the flight compartment, recent thinking provides placement of certain radio controls on a central panel usually located directly above and between the pilot and the copilot, and others on the control pedestal located between pilot and copilot. A few years ago it was customary to provide a master system for the pilot, say an ILS indicator and its associated receivers, and a repeater indicator for the copilot. Occurrence of a vacuum tube failure under IFR then required that the flight crew resort to emergency procedures. Present thinking provides two complete, independent systems, one for pilot and one for copilot. In event of malfunction of one system, the alternate system is immediately available—thus tieing back directly to safety and reliability as mentioned earlier.

The radio engineer will come up with a master plan showing location of all components in the airplane, an over-all schematic diagram of the entire system, and a series of detail drawings to guide preparation of non-standard parts such as junction boxes, control panels, mounting brackets.

Removal of Old Equipment

Meanwhile, mechanics have proceeded to remove all equipment to be discarded from the airplane, and to remove adjacent items that would otherwise hinder subsequent operations. Removable items to be retained, such as receivers, indicators and units of similar nature, are taken out and sent to overhaul. Wiring, disconnect plugs and junction boxes are given a close visual inspection and/or electrical checks to determine their suitability for future use. Any doubtful parts are removed and a proper notation made for a replacement. Finally, a point is reached where all necessary components have been removed and it is time to start installation of new equipments.

Installation of New Equipment

Skilled shop personnel construct the junction boxes and control panels at the bench, working from the engineering drawings. Since these components nearly always are designed to fit within available space locations, all possible work is completed while in the shop so as to minimize the time and personnel required for installation in the airplane. Thus we find that terminal strips, relays, and disconnect receptacles are installed in the junction boxes and are completely wired at the bench. All tuning dials, control switches and indicator lights are installed on the control panels and likewise are completely wired.

Necessary shelves and mounting brackets are constructed according to drawing details and are installed in the airplane when completed. Interconnecting wire cables, often having disconnect plugs for ease of unit removal, are fabricated, tested, and installed in the airplane. Flexible tuning cables also are fashioned and installed at this time.

Next, the unit mounting racks are placed at their designated locations, checked for possible interference to adjacent units, and secured to structure. Since most, if not all, radio equipments incorporate electron tubes, the mounting racks utilize shock mounts or vibration isolators in order to minimize vi-

(*Continued on page 56*)

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Engineered Radio

(*Continued from page 54*)

bration transfer from structure to equipment. Units are then installed by merely sliding them into their respective racks and securing a few thumbscrews. Disconnect plugs automatically complete the electrical circuits except for a possible antenna connection that must be isolated from other wiring.

During installation, the pilot usually maintains a watchful eye on the over-all proceedings and stands by to resolve decisions on minor changes as they occur.

A point-to-point check of all interconnecting wiring against the master schematic diagram is standard practice and tends to minimize "cross-connections" and other gremlins. A careful check is made of connections into the airplane electrical power system. All units are then installed and the completely installed radio system is ready for ground check.

Ground Check

An auxiliary power source is connected to the airplane and control switches are manipulated to place individual units in operation. This is done to make sure that each switch positively controls its labeled unit. Next, all units are checked for operation according to audible or visible indications. Then comes tune-up or calibration. Each item or system has its own tune-up procedure and is accomplished by skilled technicians who follow the manufacturer's prescribed sequence of procedure. This step is important as the best possible piece of equipment can provide less than mediocre performance when improperly adjusted.

The communication-navigation equipment in common use today is rather complex as compared to that of five or 10 years ago. Accordingly, the test equipment needed for proper adjustment is more complicated and requires trained technicians who understand its use. A serious operator, such as Smith-Meeker Engineering, will have many thousands of dollars invested in test equipment.

After all units have been adjusted, calibrated, and otherwise readied for their assigned task, the inevitable last-minute chores are accomplished. All disconnect plug lock nuts are checked, all mounting rack thumbscrews are safety wired, and, in general, each component of the system is given a close visual inspection. Actually, this operation may be considered as standard aircraft practice but the fact remains that a good inspection is vital to aircraft operation. All adjacent areas are scrutinized for possible mishaps during operations.

There are certain checks that must be accomplished while aloft, and these are usually done on a flight for that specific purpose shortly after installation. A technician sometimes goes along to make the checks and to perform necessary adjustments, if needed.

Technically, this last step completes the project. The radio engineer has transformed the nebulous ideas of the pilot into the actuality of equipments arranged to provide convenience, reliability, and top performance. From the pilot's point of view, he will find that the planning poured into his radio system will be repaid many times over by permitting his full use of modern navigational facilities so as to increase the safety of his craft under all conditions.

Russian Rotary Wing

(*Continued from page 13*)

been developing rotary-wing aircraft since the early '30's, and small batches of A-7-3a gyroplanes were delivered to the Red Army shortly before World War II. However, primary interest was centered on the helicopter and TsAGI produced various machines of the "-EA" series, including the I-EA designed by Boris N. Yuriev, which attained a record height of 19,800 feet but crashed after control was lost in its descent; the 3-EA which made a number of flights of 10 to 14 minutes duration, and Ivan P. Bratukhin's 5-EA. In 1941, Ivan Bratukhin's successful *Omega* helicopter was flown, but further development was prevented by the war.

On Soviet Aviation Day, in 1946, developments of the 1941-*Omega* were demonstrated with other experimental helicopters, but it was not until the Aviation Day Air Display held at Tushino on July 8, 1951 that the first concrete evidence of the quantity production of any one helicopter type was apparent. Much to the gratification of assembled Muscovites, a formation of nine helicopters of a type designed by Mikhail I. Mil gave a series of demonstrations. Other helicopters that were demonstrated included a heavy twin-rotor transport helicopter credited to Ivan P. Bratukhin, and a small two-seat helicopter designed by N. I. Kamov and which appeared to be a development of his K-17 *Vertolet* of 1948.

Mikhail Mil has been collaborating with other designers on helicopter development since before the war, but the machines demonstrated at Tushino is believed to be his first design accepted for quantity production. Bearing some resemblance to the Air Force's Bell H-12 and the RAF's Bristol *Sycamore*, the Mil helicopter appears to be a three or four seater of all-metal construction and powered by a 600- or 650-hp ASh-21 radial engine.

Featuring a simple basic layout, the Mil has a conventional three-blade main rotor and three-blade anti-torque rotor. Drive from the engine is taken to the main rotor head via a vertical shaft and to the anti-torque rotor via a shaft running down the tail boom. Cooling air appears to be drawn from an intake above the cabin by an engine-driven fan and exhausted through grills at the sides of the fuselage. The fuselage comprises three sections; the nose section which is probably a metal monocoque and has a number of transparent panels, the center section with a welded steel-tube frame and metal skin, and the rear section which has a welded steel-tube frame and fabric covering. The enclosed cabin appears to seat two side-by-side with dual controls and one or two passengers behind the pilots. The landing gear is of fixed tricycle type with a castoring nosewheel. A tail skid is fitted at the crank of the tail boom to prevent damage to the tail rotor during take-off or landing under gusty conditions.

Four types of helicopter, one of which is the Mil, are reported to now be in mass production in the Soviet Union for the Army cooperation elements, and one type for the Naval Air Arm. At least one of these machines is in a similar class to the Piasecki XH-16, the Air Force's twin tandem-rotored helicopter for troop transport.

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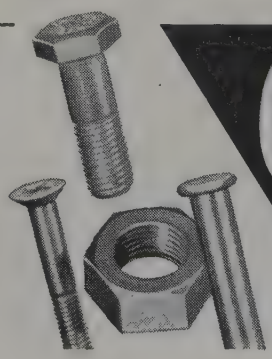

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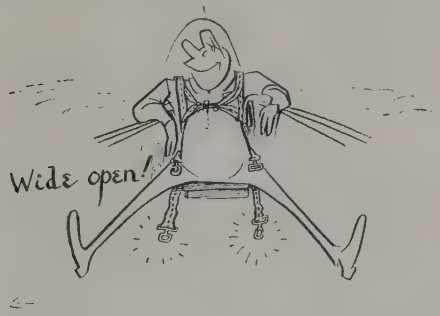
Dilbert

(*Continued from page 40*)

his weird, tumbling fall. The chute just hung there after that, the open leg straps dangling crazily in the breeze. I cringed and turned away. As I did, I thought I heard a faint, anguished cry . . .)

That, fly-boys and girls, is a rough idea of the picture that flashed across my inward eye the other day as I floated safely to earth under the most beautiful canopy in the world—the one you see when you look up *into* an open parachute.

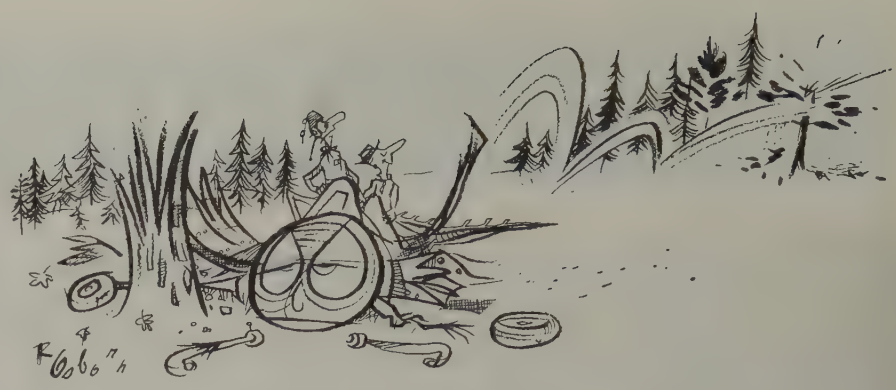
I was floating down because something had gone wrong with my prop. It suddenly ran so rough it threw the engine, and the plane went out of control. The thing that really unnerved me, however, was that only about a minute before this I had been flying with my leg straps *unbuckled*. I get ostrich pimples just thinking about it. Whatever caused me to button up I'll never know, but I'm sure you believe me when I promise I won't ever be caught with my leg straps down again.



Yes sir, that one cured me! I'm a safety convert now. I figure, if you aren't going to keep your parachute harness properly fastened, you might as well stop kidding yourself and leave the whole thing home. Hereafter, I'll accept the slight discomfort of being buttoned up tight as a small price to pay for the added safety involved. Anyone catching me otherwise has my permission to kick my parachute seat way up to my clavicle.

Wanna Be a Hero—Dilbert gets jeered at so often for his bonehead tricks that I'm glad of this opportunity to give him a pat on the back for a change. His gallant action in this emergency, his utter disregard for his own safety, were certainly above and beyond the call of duty. Of such things are heroes made.

But now that it is all over, Dilbert isn't so sure about this hero business. He wonders if it wasn't just another boner. Seeing him with his arm in a cast and his nose making like Durante, you get his point. Anyway, you be the judge.



"Dilbert pulls an heroic Chinese three-pointer"

It all started when he took a friend out for a joy hop. All went well until the motor conked out on the way home. At the time they were flying at 2500 feet altitude, following a river which flowed through a heavily wooded area. What would you do in a case like that?

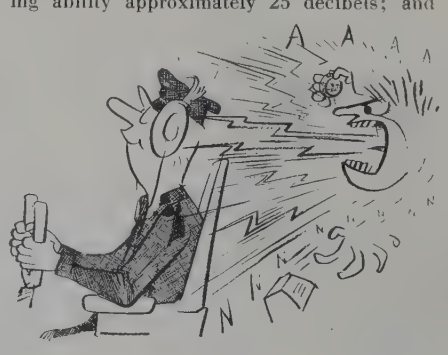
That was Dilbert's first reaction, too, but even as he nosed over to make like a motor boat, he remembered that his friend could not swim a stroke. Not only could not swim, but Dilbert knew he had always been paralyzed with fear of the water. What to do now? Without giving it another thought, Dilbert swung around and headed for the tall timber.

He shot for the clearest area within range. At 50 feet altitude they hit the first pine. It sheared off half of the right wing. A moment later the left wing was left behind. The fuselage went another 150 yards before it struck the ground, then it rebounded and traveled sideways until it slammed into a burly oak.

Dilbert didn't even have the pleasure of cussing out his quondam friend. When that unworthy came to, he showered our hero with a profusion of thankfulness for deliberately choosing the greater, the more dangerous, of two evils. Besides that, he evinced such a burning desire to learn to swim that Dilbert didn't have the heart to let fly the tongue lashing he had prepared.

My Aching Ears—We have all been annoyed by the ringing in our ears and have experienced the mild earache that occurs when we descend in an airplane. But did you know that this is usually accompanied by a partial loss of hearing? The latter can be dangerous to pilots and radiomen who may be depending on the beam, or voice radio for orientation.

The medics has made tests which show that descent from 5,000 to 3,000 feet reduces hearing ability approximately 25 decibels; and from 2,000 to 1,000 feet by approximately 15 decibels, *if*, that is, the pressure on each side of the ear drum has not been equalized.



Don't let this decibel business throw you; it's merely a yard stick for measuring the intensity of sound. For instance, the intensity of the conversational voice at 12 feet is 50 decibels, approximately the same as the radio and beam at ground level. By the time static and other interferences get into the act, however, often no more than 15 decibels of sound will be heard through the earphones. If, then, your signals are normally coming through at 15 decibels and you reduce your hearing 20 decibels by making a rapid descent, a little arithmetic will show how nice and quiet everything is apt to be—but not how dangerous.

Your hearing will return to normal during and after loss of altitude when the air pressure is the same on the inside of your ear as it is on the outside. Swallowing, yawning, or holding the nose and trying to breathe out will generally accomplish this. If all this fails to bring relief, the plane should be taken up again and brought down more slowly.

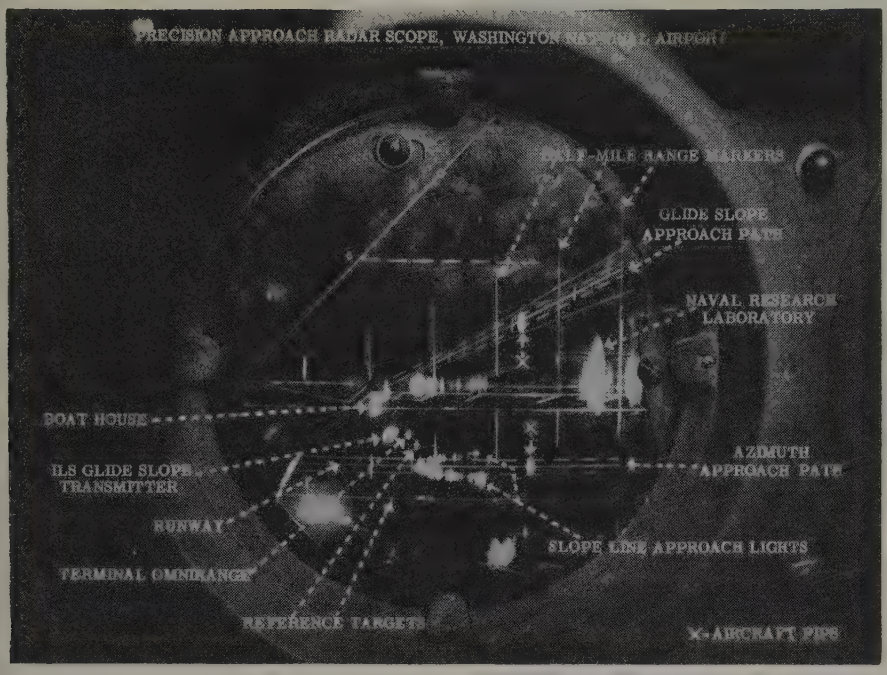
In case of a cold, the Eustachian tube may be blocked by swollen tissue. If so, it may be cleared by shrinking these tissues with a nasal spray, suitable inhaler, or medication. If you have a serious head cold, high-altitude flights are not advised.

SETH'S SAFETY QUIZ

1. Do regulations require parachutes to be worn on privately owned aircraft?
2. In 25 words or less, explain why you should not use flaps to land in a high wind.
3. When is a safety belt not a safety belt?

Safety Quiz Answers

1. No, but common sense does.
2. Mainly because then you can land tail high, giving wings slightly negative angle of attack, thus less subject to ballooning and loss of control.
3. When it's unbuckled. That's no joke, son.



PRECISION APPROACH radarscope *(left)* picks up ground returns from prominent objects, some of which are identified on this photo, in addition to the usual aircraft pip

Present Use of Radar Limited

Radar at Washington National gets praise, criticism at RTCA Assembly

Washington National Airport's "very limited radar set-up"—which is just a start at implementing the next transition step towards the proposed nationwide "Common System" of air navigation and traffic control—received two days of praise and criticism at the 1952 Annual Spring Assembly Meeting of the Radio Technical Commission for Aeronautics, March 25-26 in Washington, D. C.

After one day's technical indoctrination in radar and traffic control by four "operators" and six "users" of the system, the 250 RTCA members and guests attending the Assembly descended upon the radar facilities at Washington National (DCA) to see for themselves.

Results: "Radar's wonderful, but it's got to see lots of improvement before either operators or users will be satisfied."

Present Use Limited ▶ When CAA administrator Charles F. Horne at the opening of the technical program, described the system as the "very limited radar set-up of today" he meant that much work lay ahead before a completely finished radar traffic control system could become an operative reality. Compared to the system envisioned to develop from the present set-up, this can hardly be called "radar control." Yet this forerunner of tomorrow's more systematic network is the first in the nation to take on a portion of the civilian traffic load.

Civil use, which began January 7, is limited to controlling aircraft departing from DCA. For some time, however, the system has been controlling both inbound and departing military flights at Andrews AFB a few miles east of DCA.

Results So Far ▶ Delays have become practically nil since radar departure control has been in use, James L. Whitmore, chief air route traffic controller, reported in a paper on radar terminal area control. Where delays used to average 30 minutes in heavy weather, we are now "operating with virtually dry runways," he said. Departure delays used to approach two hours in extreme cases. Now a maximum of 20 minutes is unusual and has involved only a few aircraft.

Other benefits pointed out by Whitmore during the morning session include more efficient use of the air space around the terminal area. In the past, manual control has required 10 minute separations between aircraft because position in the area was not known exactly. This meant that a 180-mph airplane took up a 30-mile block of air space in order to insure adequate separation.

Now radar displays the exact position of all aircraft in the area and separations can be greatly reduced. "If, for example, radar provides three-mile lateral separations, we can put 10 aircraft in the same space formerly taken up by two aircraft under the manual system," Whitmore explained. "Actually the capacity with the radar system is even greater when lateral as well as longitudinal spacing is employed," he pointed out.

The System ▶ Three search radars serve the Washington area system (*Navicom Feb. 1952*). A long-range AN/FPN-12 microwave early warning (MEW) radar stands at the Air Route Traffic Control Center on the hill just west of the DCA tower. This covers a range of 100 miles. An AN/CPN-18 surveillance radar operates at Andrews AFB and a CAA Airport Surveillance Radar (ASR) operates at the DCA tower.

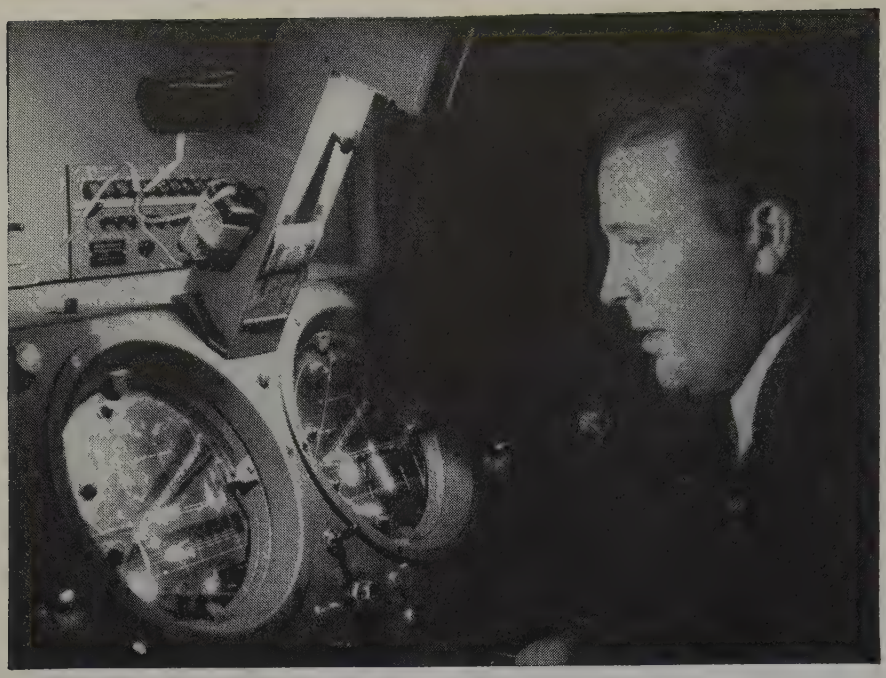
Outbound and inbound military traffic at Andrews is handled on the FPN-12 and the AN/CPN-18, while departure control at DCA uses the FPN-12 and the ASR.

ASR and MEW as used at DCA complement each other. Either can back up the other if a radar failure should occur. ASR is more convenient for close-in work because of its more rapid scan (27 rpm) and its better resolution. The MEW's long range means that aircraft can proceed outward on a straight course instead of circling to gain altitude in order to stay in contact with a shorter range radar.

Trial Flight ▶ Departure control works this way:

When an airplane at DCA taxies out to the runway, the tower obtains a clearance from the Air Route Traffic Control Center to an outlying fix, such as "HERNDON 4,000." On take-off, the pilot is advised to contact the Radar Departure Controller in the tower on 120.7 mc. The Controller, who has identified the aircraft by observing it on the ASR since take-off, separates this flight from all other traffic under tower jurisdiction. He spaces it from preceding de-

(*Continued on page 62*)



CAA AIRPORT TRAFFIC CONTROLLER talks down an aircraft by means of approach radarscopes in the tower. Three-mile scope *(above)* is on the left; the 10-mile scope is on right

RTCA Assembly Shows Present Use of Radar Limited

(*Continued from page 61*)

partures as well as incoming traffic.

This done, the pilot is advised to contact Terminal Control at the Enroute Center on 119.7 mc. Terminal Control, advised of the departure by the tower, has been tracking the flight on the MEW since take-off. Here the flight becomes a plastic marker on the MEW's 24-inch Skiatron plotting display and Terminal Control continues the separation control until the flight reaches the separation minimum required for the manual control used enroute. This takes anywhere from 5 to 60 miles from DCA, depending on the speed of the aircraft. Terminal Control also issues enroute clearance to the flight destination.

Supplements Needed ▶ Improvements discussed for the system included:

VHF/ADF: This ground-based direction finder simplifies spotting on the ASR scope, the aircraft being contacted by the controller. When the aircraft transmits on VHF to the controller, the DF automatically draws a line of light on the scope from the aircraft pip to the center of the scope. This tells the controller which pip on the scope is the airplane contacting him.

Automatic Data Transfer: A fundamental weakness recognized by the controllers is in the handling of data. Although not serious at present, it could become the bottleneck when traffic becomes heavy. Although modern radar is used, flight data is still transferred by the same means used in conventional manual separation controls. Voice communication and written information need to be reduced to a minimum. One step towards this goal is the GRS interlock equipment used at control and approach centers to portray the altitudes used in the traffic feeding process.

Airborne Beacons: Users placed heavy emphasis on the need for devices which will prevent aircraft targets from fading out on the radar scopes during rain. Principal solution to this problem is an airborne transponder beacon (Navicom Apr. 1952) which was referred to at the Assembly as the "Missing Link" in radar traffic control. The ANDB has new beacons, designed for the Common System, under development. Two have been delivered to flight test centers for evaluation.

Users who advocated use of the wartime APN-19 beacon (known affectionately as "Rosebud") were told that this lightweight beacon lacks the necessary frequency stability. However, many still think that this beacon is better than nothing.

Another device, proposed by Dr. Luis Alvarez in a letter read before the Assembly, suggested that corner reflectors be used to make small aircraft better radar targets. At first thought this proposal appeared simple and inexpensive since the ordinary corner reflector is a rudimentary device which requires no power. But anticipated designs would make the airframe itself a corner reflector by including slots in the airfoil.

Communications Speeded ▶ Speaking of communications as the "backbone of air traffic control," Gordon C. Pearson, CAA Airways Operations Division, reported a plan for conversion of teleprinter systems from a 60-word-per-minute system to new equipment which will handle more than 100 words per minute. In addition, he said, the Air Coordinating Committee and the ANDB were looking into the possibilities of a new system which could operate at 600 words per minute. This system would employ a magnetic drum for collection, storage, and distribution of data.

Radar Approach Feeder ▶ Use of radar for feeding planes into final approach was described by CAA operations Specialist Frederick C. Glass. Traffic in the terminal area could be expedited by vectoring by radar so that they fly the most practicable route from the area perimeter to the gate on final approach. The course could be chosen to cause the airplane to arrive at the gate at the desired time to maintain the best spacing from the preceding flight.

Other News From RTCA ▶ Five new member organizations were voted into RTCA at the March 25 business session. Bringing the total to 97 group members, the newly elected are: American Telephone and Telegraph Co., Ford Motor Co., General Motors Corp., Kollsman Instrument Corp., and General Railway Signal Co.

A coordinated plan for an air traffic control signalling system (private line), traffic delay predictors, and a traffic data relay and display system is being worked out by subcommittee SC-59, RTCA executive secretary L. M. Sherer announced.

An expert group made up of representatives of point-to-point communications companies is being established on recommendation of SC-59 to advise RTCA on aeronautical communications, RTCA chairman Dr. J. H. Dellinger announced. Representatives of American Telephone and Telegraph Co., Western Union Telegraph Co., Bell Telephone Laboratories, Automatic Electric Co., Engineering Research Associates, and the U. S. Independent Telephone Association will be included in the group.

Another subcommittee is investigating communications requirements, particularly VHF utilization, for the transition phase of the SC-31 ANTC program. Voice communications for air traffic control systems will receive special attention. VHF is proposed for non-military users and UHF for military users.

Plug-In Amplifier Developed

A new miniature plug-in amplifier characterized by exceptionally high gain and relative independence of power supply voltage fluctuation has been developed by Engineering Research Associates, Inc., of St. Paul, Minn. Specific characteristics include a maximum gain of 9,000 and a flat frequency response from 2 to 1000 cps. Maximum output voltage is 20 volts. Unit measures 1⅞ inches by 2¼ by 3 inches.

Corporate Pilot and Radar Control

Representative of CAOA calls for development of Radar Safety Beacon

by Walter C. Pague*

Perhaps one of the most serious things that has retarded air navigation and traffic control improvement during the past is the simple fact that the radio technical people have not truly understood the pilot's operational requirements nor does it appear that the pilot understood the problems of the radio technical people. However, in the past few years particularly, I feel sure that the majority of corporation pilots has made as honest and sincere effort to cooperate and reach an understanding with the CAA and the manufacturers of electronic equipment and instruments. The instrument and electronic manufacturers have taken great strides in the development of navigational aids, some of these aids being used almost entirely in company-owned planes. This is certainly indicative of the interest corporate pilots hold for the safety and convenience of operation for all concerned—*including* traffic controllers.

In this discussion, I shall limit my remarks to the airport or terminal area traffic control problems as they apply to the corporate pilot and his use of radar traffic control. The terminal area is the eventual air traffic flow bottleneck since each aircraft must pass through two terminal-area control systems in order to carry out a flight plan and the closest of integration of the ground-control personnel and the aircraft pilots are of absolute necessity. The responsibility which is most important in the air must be placed there rather than on the ground and, conversely, responsibility which should be on the ground, should be there and not in the air.

Before I proceed further, I wish to go on record as one corporation pilot who is convinced that *radar traffic control is the answer to positive and precise terminal navigation.* Presently, at terminals where the use of radar is not employed the only position information available to controllers is navigational estimates of position reported by aircraft pilots. These may be in error by many miles, either from instrument error in the aircraft or from delay in receipt of reports. Those of us who fly airplanes will acknowledge this fact, I'm sure.

Of the many corporation pilots I have talked with regarding radar traffic control, none has indicated a lack of confidence in the system. True, some of them have felt that the responsibility of maneuvering their aircraft into position for a landing is theirs and they will only have it that way, assuming that adequate instructions are received from the controllers. They like the idea of radar surveillance and monitoring, for it is a supplemental safety factor along with their other electronic aids in the aircraft. Most of our pilots particularly appreciate the monitoring during an ILS approach when the PAR operator can keep him advised if he is exceeding the safety limits of the glide path or localizer course.

One of the glaring weaknesses that exists in our present radar installation undoubtedly is that of positive aircraft identification. This is a fact that is recognized by ground controllers more so than by pilots. As most of us here at this assembly know, this weakness develops considerably when adverse atmospheric conditions are in evidence. An experienced radar observer apparently does not find it particularly difficult to identify aircraft within the control area when stable instrument conditions exist. He primarily identifies the aircraft by noting its heading versus its approximate radioed position. However, when turbulent conditions are prevalent due to thunderstorms and the like, it is not uncommon for him to simply lose his target on the scope for an indefinite period of time. Certainly this is not a comfortable feeling for the controller, and a far less comfortable position for the pilot of the approaching aircraft, particularly if he is in the final stages of a GCA and depending wholly on the PAR operator for instructions.

Identification apparently is not such a major problem for the controller when larger types of aircraft are involved in the pattern, as is the case with most scheduled airlines and for many corporation operations. However, many of our company-owned planes are smaller single-engine types that cannot be readily seen on our radar of today. Perhaps, these smaller single-engine craft should not be operating under adverse weather conditions, but a small percentage inevitably will be somehow. This is the

(*Continued on page 64*)

*Talk given before Radio Technical Commission for Aeronautics at 1952 Assembly, at Washington, D. C.

Corporation Pilot Views Radar Traffic Control

(Continued from page 63)

operator who really has to be looked out for because of his single-engine limitations. Chances are he cannot afford to miss that first approach.

The solution to positive identification lies in the use of the Radar Safety Beacon. The Operational Policy Group in 1950 proposed then that the beacon be pressed as a top priority item.

In talking with Air Force radar observers the strong consensus of opinion is that it is of primary importance that positive identification be realized through the use of beacons. All you have to do to be convinced that the beacon is the answer is to observe the transmission from the aircraft on the radar screen.

On a recent visit to the CAA Technical Development and Evaluation Center it was quite surprising to me to learn that no evaluation whatsoever is being carried out on beacons.

It would appear that no definite decision has yet been made as to whether or not the policy will be to develop radar to accommodate the exigencies of positive identification or to promote the development of Radar Safety Beacons.

Because of the practicability, low weight and low cost of the Radar Safety Beacon, the Corporation Aircraft Owners Association strongly urges the development and appliance of the equipment.

During my visit to the TDEC in Indianapolis, I spent considerable time with Mr. T. K. Vickers, who is a veteran Air Traffic Controller and whose assignment is with the Air Traffic Control Section. Mr. Vickers was very thorough in his explanation and demonstration of the traffic control simulator known as the naviscreen. As you know, this device can simulate any given traffic condition for any terminal or station so desired.

From this demonstration it was quite obvious that a standardized system of voice communication between radar traffic controllers and pilots is highly important. Misinterpreted or misunderstood instructions by the pilot of an aircraft holding in a stack causes immeasurable inconveniences and delays to other pilots in the pattern. The already overcrowded voice channels are materially aided by pilots using the ILS as their primary let-down and final approach facility with the PAR monitoring as the secondary source. Through experience I have noted that some controllers are inclined to be a bit too talkative and consequently would tend to alarm an unseasoned pilot who may be making his first radar approach. Instructions that are concise and to the point seem to serve adequately. Fortunately, most of our corporation pilots are experienced in the dexterity of instrument flying. Frequently the corporate pilot is required to operate on instruments over a route and into a terminal that he has never had the opportunity to survey. Consider the usual high calibre of business or technical personnel he is carrying that expects him to complete the flight with precision and safety.

Radar Traffic Control appears to be the solution at the terminal and enroute.

ASDE Picks Up Airport Surface Detail, Birds, People

Even birds sitting on a runway are said to be visible on the scope of the sharp-beamed ASDE (Airport Surface Detection Equipment) radar which is still undergoing development.

Designed to spot aircraft and ground vehicles on large airports, the system will permit controllers to see runway and taxi movements when visibility is low.

Besides outlining runways and the airplanes on them, the radar can see openings in fences, grass borders around abandoned garden areas, and other details.

The radar owes its high resolution and ability to see very small targets to its k-band transmitting frequency in the neighborhood of 25,000 mc. This is equivalent to wave lengths slightly greater than one centimeter.

Development of the system began early in 1947 when Watson Laboratories converted one of the Navy's shipborne harbor search radars to airport duty. As a result of tests made in collaboration with Airborne Instruments Laboratory a contract was awarded to Gillfilian Bros. for construction of two more systems. One of these has since been improved upon by AIL for ANDB. Tests and evaluation are now being carried out by AF and CAA Technical Development.

ANTENNA system is part of Airport Surface Detection Radar at the Weir Cook airport

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PLANE FAX

Quick picture of

BRADLEY FIELD

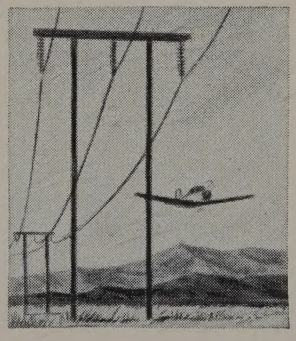
Boise, Idaho

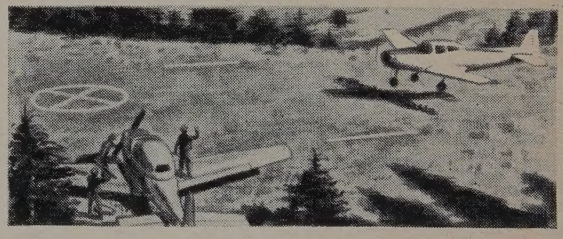
3000' graveled runway, lighted on request . . . free tie-down . . . CAA weather and communications . . . 'round the clock repairs and maintenance . . . cafe and modern skytel on field . . . complete Standard Aviation Service.

Skyport for wilderness flyers!

J. I. Mayes, manager of Airport Service Company at Bradley Field, takes justifiable pride in the fact that since 1948 this field has held the Haire Trophy for outstanding achievement among community airparks in the United States. He tells this story:

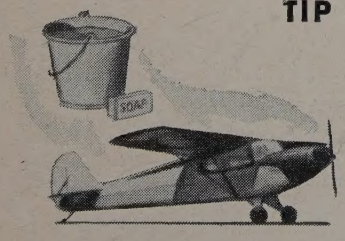
"Here at Bradley, we're a hopping off place for Idaho's huge Wilderness Areas. And we fly in to mines, patrol pipe and power lines, serve farm flying needs, and maintain an active flying school. These varied activities mean we encounter plenty of rugged flying, and demand that our engines always be in top shape. That's one reason we use Chevron 80/87 Aviation Gasoline and RPM Aviation Oil. We know they're tops for light plane engines.



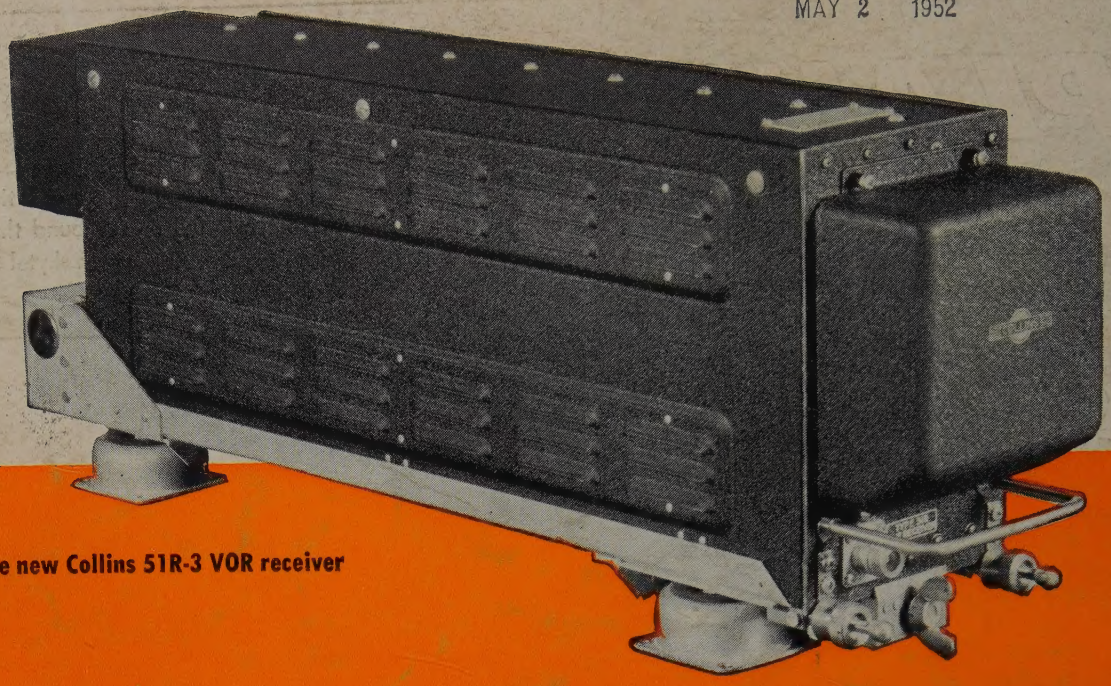


"Mountain flying, particularly, calls for an all-weather high power performance in aviation products. With Chevron '80/87' we've ended take-off knocking and pre-ignition—big points when you're taking off from a small mountain meadow or one of the wilderness landing strips. And, we've doubled the flying hours between complete overhauls since using RPM Aviation Oil in our planes—with a consequent saving of hundreds of dollars for us."

TIP OF THE MONTH



Always keep your plane washed down, especially in dusty spring and summer flying. This will insure complete freedom in control pulley operations—an important safety factor in small plane flying.



The new Collins 51R-3 VOR receiver

The leader in VOR Leads again!

It was 1946 when Arinc tossed the omnirange ball into the radio industry's court. Collins has been throwing baskets ever since.

First demonstrations of the Collins 51R airborne VOR receiver and instrumentation were made in January, 1947, for Arinc, commercial airlines engineers, and the Air Transport Association's research group. Collins designs were approved.

Within a year, orders for 51R equipment were received from American, Chicago & Southern, Northwest, Pan American and United. Since then almost every leading airline of the United States (and, most recently, Air France), as well as many users of executive aircraft, have adopted the 51R as standard.

Collins has earned and is widely accorded the leadership in the VOR field and today, by a wide margin, is the largest producer of airborne VOR receivers and accessories.

The 51R research-engineering team has never stopped playing ball — studying users' servicing and performance reports — engineering refinements and incorporating them in 51R design. The 51R-2 was a prime example of the value of this continuing effort toward the ultimate.

We now announce the 51R-3, which represents the latest advances in performance and ease of servicing.

In general, the changes include, a: greatly improved stability over wider ranges of temperature and climatic conditions, and b: potentiometer type adjustments for all major instrument circuits, and component location changes which save much bench test time.

There is a 51R-3 illustrated descriptive bulletin waiting for you. Please ask us for it on your business letterhead.

In radio navigation equipment, it's . . .

COLLINS

COLLINS RADIO COMPANY, Cedar Rapids, Iowa

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